THE PAPER INDUSTRY and PAPER WORLD

AN EDUCATIONAL NEWS MAGAZINE — SEPTEMBER, 1938

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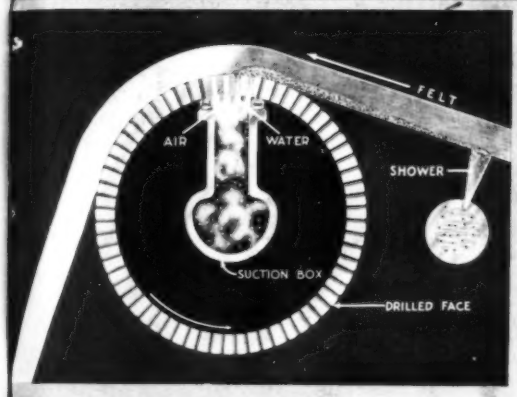


Suction Felt Roll

D

Full Width Cleaning CONTINUOUSLY

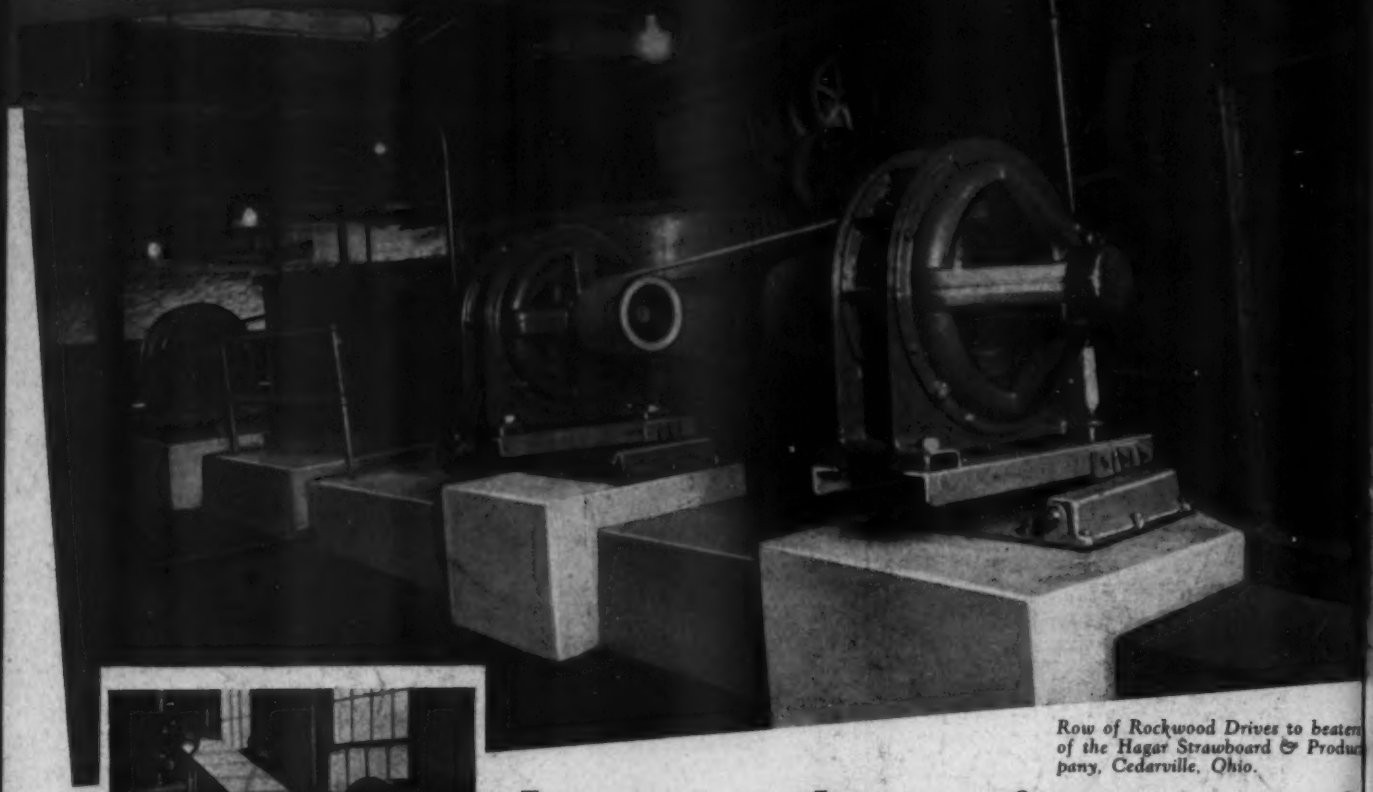
The dotted area in the photograph indicates the suction box which extends entirely across the drilled face, inside of the Downingtown Suction Felt Cleaning Roll. No active part of the felt escapes this straight line cleaning zone, thus the cleaning action is uniform, straight across the full width of the felt ... The sectional drawing shows why continuous operation cannot damage the felt nap. The travel of the felt turns the drilled shell of the roll, thus there is no friction drag over the box, no stretching of felt, no ironing of felt nap and NO POWER REQUIRED TO DRIVE THE ROLL ...This modern felt cleaning method invariably saves its cost in a few months' time...

« « « Catalog on request » » »

DOWNINGTOWN MANUFACTURING CO., DOWNINGTOWN, PA.

INSTALL

Rockwood Drives WITH YOUR MOTO



Row of Rockwood Drives to beaters of the Hagar Strawboard & Produc pany, Cedarville, Ohio.

Rockwood Drive to beater, Stevens Paper Mills, Westfield, Massachusetts.

Every paper mill compressor, driven by either V-belts or flat belts, should have the many advantages and savings of a Rockwood pivoted-motor base.

Improve the performance of paper mill machinery

And reduce costs to run

Over 200 of the leading paper mills have found that Rockwood short-center *pivoted-motor* Drives give them better performance of beaters, pumps, fans, Jordans and other paper mill machines. Not only do these driven machines perform better but *the cost to run them is less*—considerably less—as there is an appreciable saving in power *and* the cost of maintenance is cut way down—belt life often is *doubled*. These savings alone may pay for the drives in 6 to 12 months.

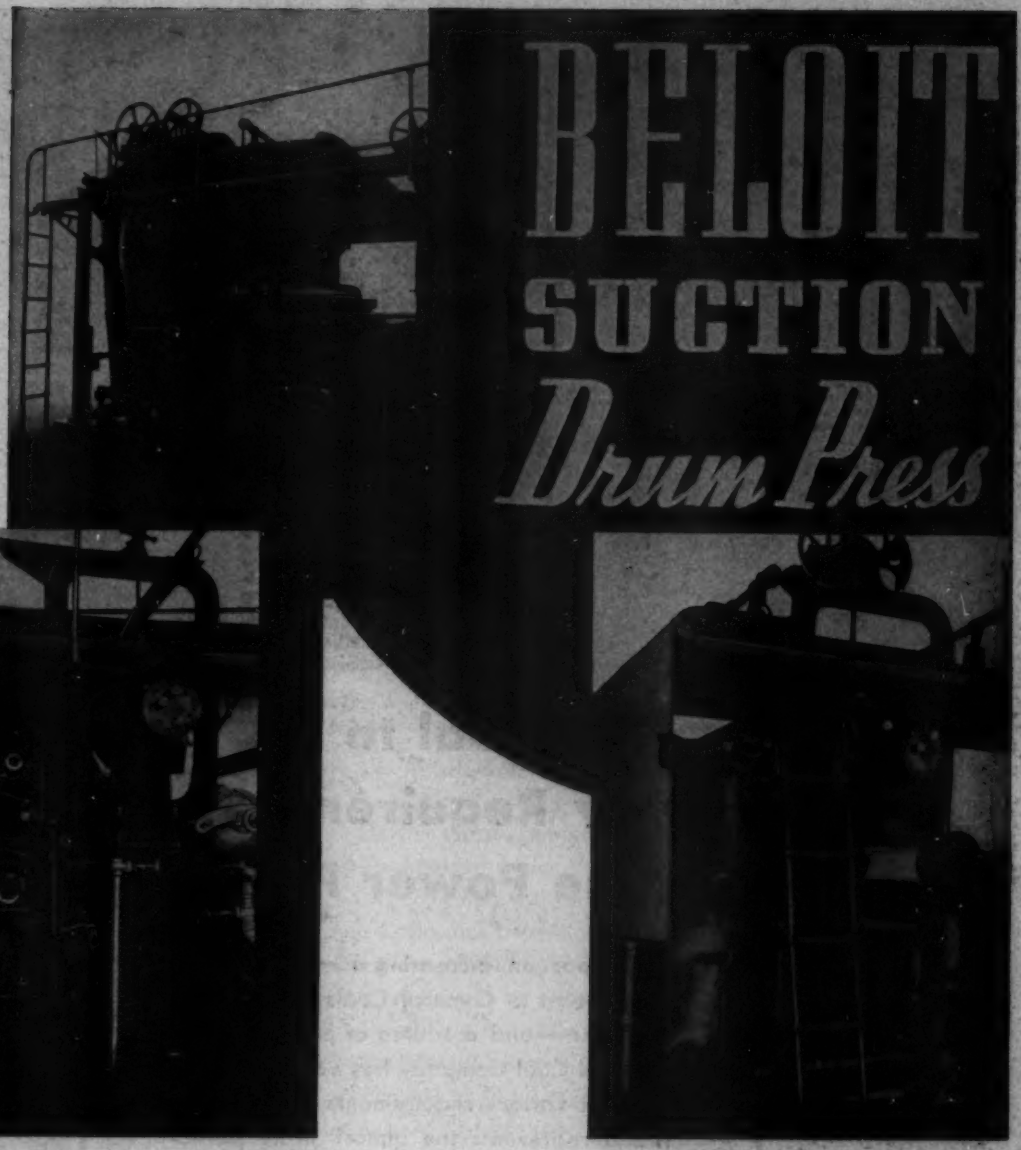
Rockwood Drives are easy to install and simple to understand. The motor is mounted on adjustable arms of the Rockwood base—so the motor can be easily moved nearer to or away from the pivot shaft. Thus *any desired part* of the motor weight can be used to provide the initial belt tension the driven machine requires. When the load increases the belt tension increases automatically—due to electric torque of the motor in opposite direction to the load—and when the load falls off again the belt tension automatically is reduced. So with the Rockwood Drive can you first establish and then forever after automatically maintain just the right belt tension to handle the maximum loads with the minimum belt tension. Belt stretch is taken up automatically. The saving in belt wear and bearings is apparent.

HAVE A ROCKWOOD ENGINEER MAKE RECOMMENDATIONS FOR INSTALLING ROCKWOOD DRIVES TO YOUR MACHINES. Follow the lead of the prominent engineers and paper makers who have thus improved driven machine performance and reduced costs. Rockwood pivoted motor bases are beneficial with both V-belts and with flat belts. Every installation is guaranteed satisfactory or we won't let you keep it at any price. *Write us today.*

ROCKWOOD

Rockwood Manufacturing Company

1801 English Avenue, Indianapolis, Indiana



Results: Equivalent to suction drum and suction primary press combined

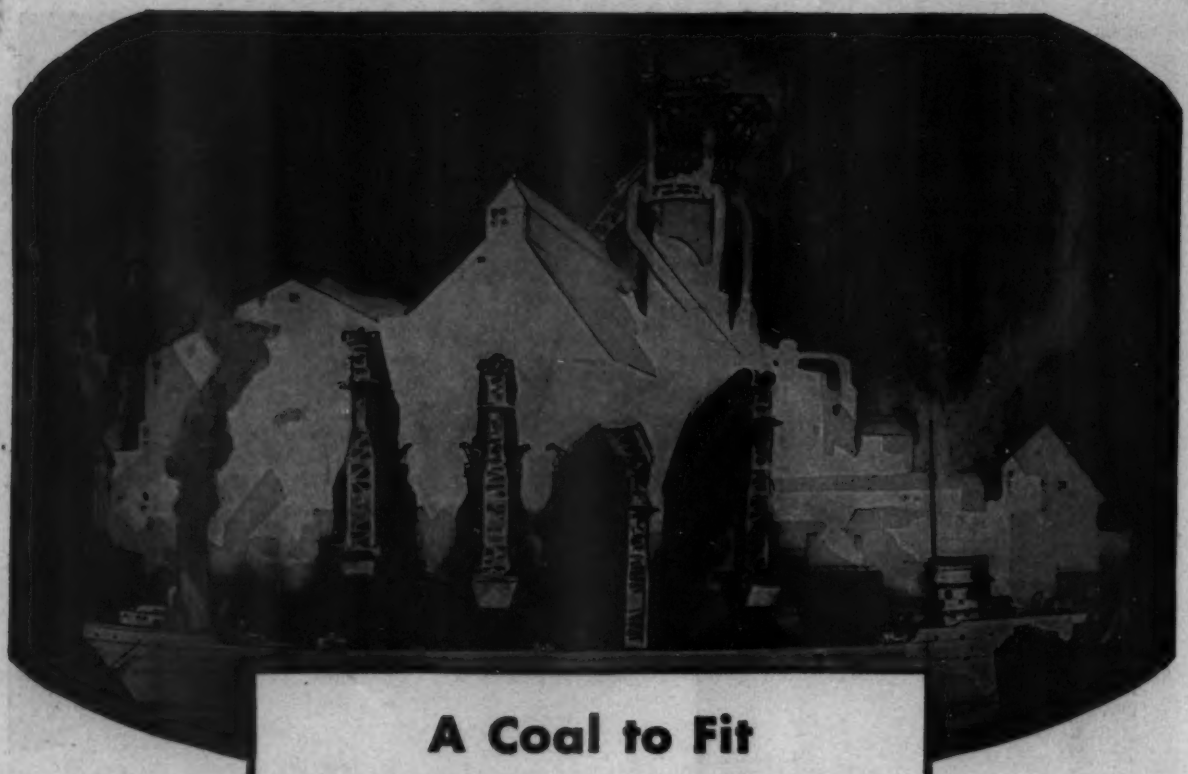
An absolute necessity on every board machine

Superior to all other methods of water removal on wet felts. • There must be a reason for over thirty of these rolls.

Ask the mills who installed them.

THE BELOIT WAY **IS THE MODERN WAY**

BELOIT IRON WORKS, Beloit, Wisconsin, U. S. A.



A Coal to Fit Every Requirement of the Power Field

Each year an increasing number of fuel buyers turn to General Coals as a source of power — and a source of profit! For the General Coal Company has various brands to meet various requirements — and every brand represents the utmost in its particular analysis.

In the interests of economical power production — take advantage of this modern organization's ability to furnish a diversity of fuel requirements from a centralized source of supply.

CROZER

PREMIX

DENDRON

DEPENDABLE ANTHRACITE

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GENERAL COAL COMPANY
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GENERAL COAL

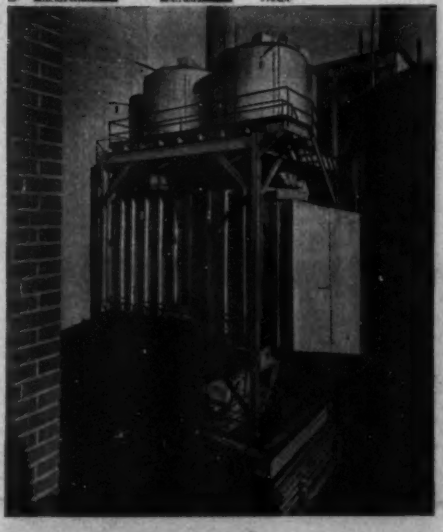
11 TONS eliminated every day AT THIS WESTVACO PLANT

DATA: Westvaco Chlorine Products Corporation, South Charleston, W. Va. . . Pulverized fuel . . 200,000 lbs. steam/hour . . 278,000 lbs. gas/hour . . 110,000 c.f.m. at 480° F. RESULTS: Ash collection per day, average 11 to 12 tons . . Draft loss not over 1.46" w.g.

THIS is one Buell installation. More than 800 other installations are today demonstrating the high extraction efficiency of the Van Tongeren system. That efficiency results from a unique, patented application of advanced aerodynamic principles. It is maintained under the most varied conditions of service, including wide boiler-load fluctuations.

Buell Fly Ash Collectors combine with efficiency every factor that makes for economy. First cost is moderate, maintenance cost very low. There are no moving parts and practically no attention is needed. Draft loss is slight, there is no distribution problem, and little space is required. Operation is by either suction or pressure. Performance is guaranteed.

The wide experience of Buell engineers is at your free disposal. You are invited to submit your fly-ash problems at once, or to request *Booklet A80.*



Buell applies the Van Tongeren system also to the recovery of many types of industrial dusts. Bulletin D81, *giving detailed information on Buell Dust Collectors, will be sent at your request.*

buell
ENGINEERING COMPANY INC
SUITE 5000, 6 CEDAR ST., NEW YORK

ENGINEERING AND SALES OFFICES IN PRINCIPAL CITIES

VALVES *be Seated!*

To good-natured Charlie Elstrodt, every chlorine cylinder valve is leaky until his own "personal" test proves it is tight. Because of Charlie's hard-boiled philosophy, because of the sureness of the compressed air test, mighty few leaky valve seats have gotten by Charlie's inspection in his sixteen years at Mathieson's Niagara Falls plant.

Charlie's job is one of about nineteen different steps in the cleaning, reconditioning and inspection routine through which Mathieson Chlorine cylinders and valves must pass before they are shipped. And in each of these operations it is men like Charlie Elstrodt, men who keep their eyes "glued on the ball", who give Mathieson's cylinder routine the backbone which makes it valuable to you.

Mathieson engineers produce chlorine of a purity second to none; and Mathieson workmen see that you get this pure product in clean, smooth-functioning containers. Couple with this Mathieson's unusual traffic and delivery facilities and their expert technical service and you see why this company presents a chlorine team that is hard to beat.

The MATHIESON ALKALI WORKS (Inc.)
60 East 42nd Street New York, N. Y.

MATHIESON CHEMICALS

SODA ASH . CAUSTIC SODA . BICARBONATE OF SODA . . LIQUID CHLORINE . . BLEACHING POWDER
HTH AND HTH-15 . AMMONIA, ANHYDROUS AND AQUA . PH-PLUS (FUSED ALKALI) . SULPHUR CHLORIDE
CCH (INDUSTRIAL HYPOCHLORITE) . DRY ICE (CARBON DIOXIDE ICE) . ANALYTICAL SODIUM CHLORITE

THE PAPER INDUSTRY and PAPER WORLD

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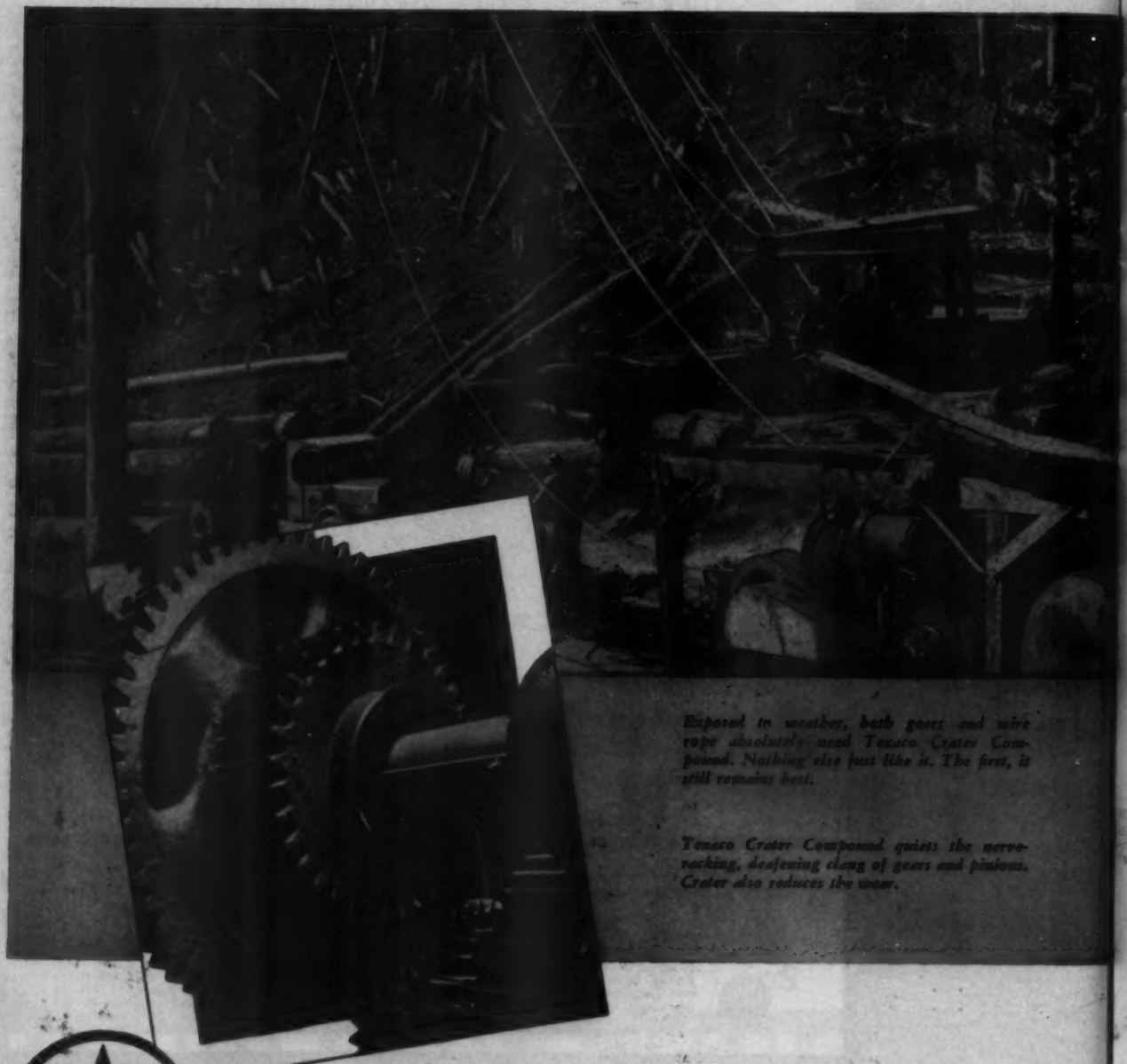
Subdues GEAR NOISE



Exposed to weather, both gears and wire rope absolutely need Texaco Crater Compound. Nothing else just like it. The first, it still remains best.

Texaco Crater Compound quiets the nerve-racking, deafening clang of gears and pinions. Crater also reduces the wear.

TEXACO

TEXACO

Preserve ROPE LIFE

You will get much longer and *safer* service from your wire rope . . . greatly reduce gear replacements . . . when you protect both with Texaco Crater Compound.

Texaco Crater Compound cushions gear teeth in a wear-resisting film that clings to metal, reducing the noise, and lasting longer.

Texaco Crater Compound seals wire rope in a tough, viscous, waterproof coating. Each wire in each strand is protected, as Crater penetrates to the core, clinging despite high speeds over small sheaves.

Many greases used for rope and gears channel, squeeze out, ball up and throw off. Such greases can't withstand exposure to wet weather, but have to be replenished all the while.

To cut *your* wire rope and gear expense, get in touch with Texaco. Prompt deliveries assured through 2108 warehouse plants throughout the United States.

The Texas Company, 135 East 42nd St., N. Y. C.

Texaco Crater Compound increases life of wire rope, chains, sprockets, conveyors, etc. It clings in any weather, hot, cold, wet or dry.

FREE *to you. 32-page Crater Compound booklet. Where and how to use Crater. Shows simple rigs for quick application to wire rope.*

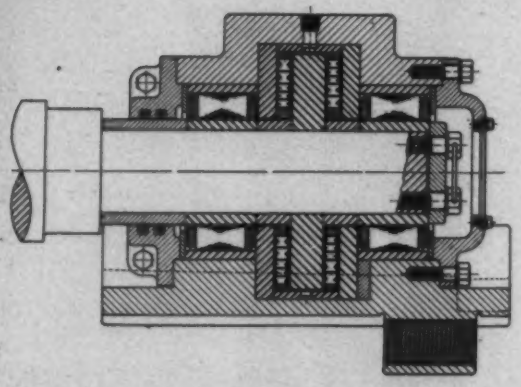
Crater COMPOUND

CONSTANT CLEARANCE OF JORDAN KNIVE

- Uniform Refinement of Your Paper Stoc

ROLLWAY BEARINGS

Reduce Upkeep Costs in this TOUGH SPOT



"Engineered TO THE JOB!"

Rollway Jordan housings are engineered to fit the old trays without change. The only machining required in the entire installation is to turn down the shaft to receive the bearing race, and to tap the end of the shaft for the locking plate. Housings ride on two tapered wedges, enabling micrometer vertical adjustment. Ample provision for lubrication and drainage. Split housings for quick and easy installation. Readily accessible stuffing box at inner end, plus water-tight construction at outer end, with removable cap for internal inspection.

In scores of change-overs and new designs, ROLLWAY BEARINGS have solved the tough Jordan problem of maintaining constant clearance between the knives of the plug and the shell—resulting in more uniform refinement of the paper stock.

Separate thrust and radial bearings eliminate all endwise, side, and vertical play, keeping the plug exactly centered in the shell and maintaining at all times the desired clearance between the plug and shell knives. After the knives are ground in, there is never any scraping or excess clearance—top, bottom or sides. Therefore, less re-blading, fewer shutdowns, greater production.

Rollway heavy-duty, double-direction thrust bearings and Rollway precision radial bearings employ only straight cylindrical rollers. They carry the load at right angles to the roller axis, eliminating all "wedging" effect. And they are engineered for all makes and sizes of Jordans—front and back bearings for motor-driven types, or outboard for belt-driven.

Types for Every Paper Mill Need!

Rollway's free Advisory Engineering Service will gladly assist you in selecting the highest efficiency Rollway Bearing for:

- Dryer Cylinders
- Jordans—all makes, front, back and outboard bearings
- Felt and Wire Carry Rolls
- Breast Rolls
- Suction Couch Rolls
- Suction Press Rolls
- Cylinder Molds
- Couch Rolls
- Main Press Rolls
- Pulp Grinders
- Chippers
- Deckers
- Slitters
- Reels
- Loose Pulleys
- Calendar Stacks—bottom, top and intermediate rolls
- Primary Presses

ROLLWAY BEARING COMPANY, INC.
SYRACUSE, N. Y.

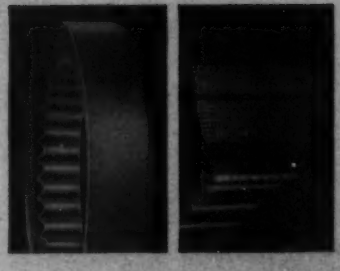
ROLLWAY BEARINGS

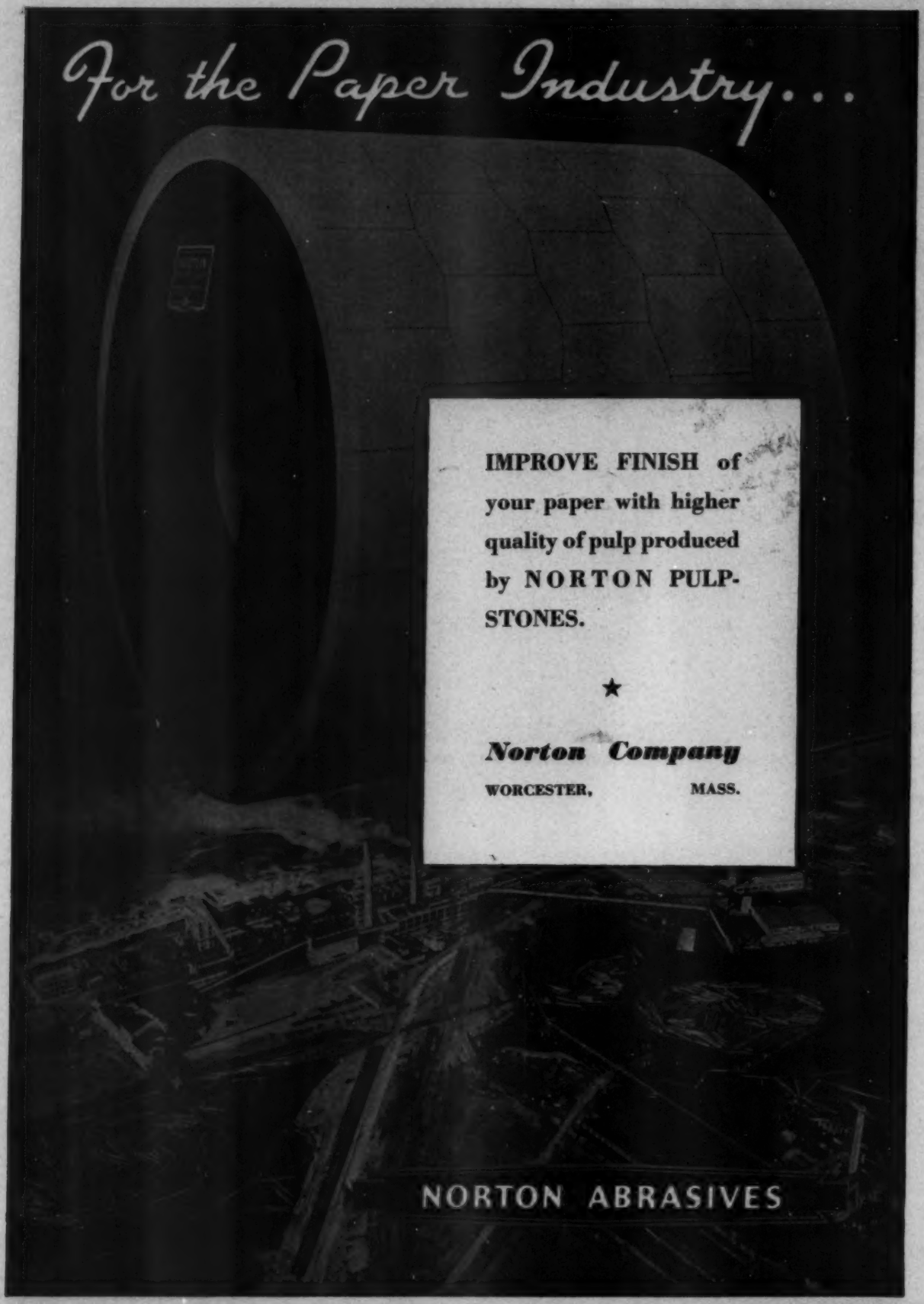
31 Years Building Heavy-Duty Bearings

STALWART

Resolute . . . adamant . . . stalwart . . . Dayton Cog-Belts have rugged stamina that's built through and through by patented, laminated construction. In Daytons—the fabric, cords and rubber compound are welded into a stalwart body that is tough and unyielding. With die-cut raw edges they have the grip and guts to take gruelling punishment and deliver smooth, constant driving power under all conditions. Daytons' extraordinary crosswise rigidity holds them straight and true in the pulley grooves as positive wedging action gives them ruthless pulling power. No clanking and chattering! No jerks! No jolts! No slipping! No writhing! No whipping or screeching! Instead, dependable Daytons deliver shockproofed power with less strain and stress on bearings—and above all, power that is efficient and economical. For complete data call your local Dayton Distributor or write us for catalogs.

THE DAYTON RUBBER MFG. CO. ★ DAYTON, O.




For the Paper Industry...
IMPROVE FINISH of your paper with higher quality of pulp produced by NORTON PULP-STONES.
★
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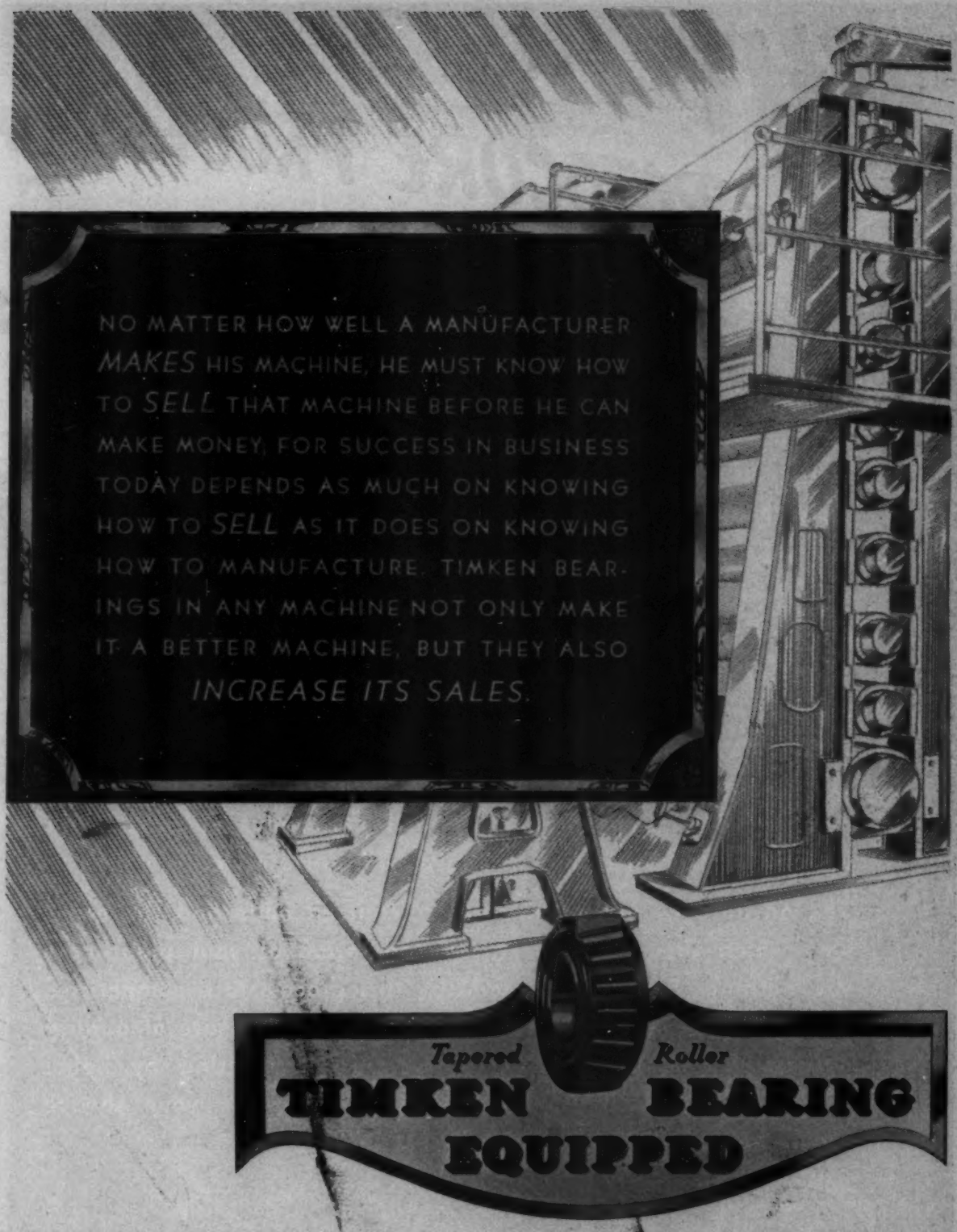

NO MATTER HOW WELL A MANUFACTURER MAKES HIS MACHINE, HE MUST KNOW HOW TO SELL THAT MACHINE BEFORE HE CAN MAKE MONEY, FOR SUCCESS IN BUSINESS TODAY DEPENDS AS MUCH ON KNOWING HOW TO SELL AS IT DOES ON KNOWING HOW TO MANUFACTURE. TIMKEN BEARINGS IN ANY MACHINE NOT ONLY MAKE IT A BETTER MACHINE, BUT THEY ALSO INCREASE ITS SALES.
Tapered Roller
TIMKEN BEARING
EQUIPPED

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

WHY THE ROTOCURE PROCESS OF PRODUCES

THE BWH Rotocure Process of Continuous Vulcanization is the only practical method of producing uniform rubber belting entirely free from press overlaps. It solves the problem because the belting is processed on an exclusive patented rotary type of press, radical in principle. It substitutes uniformity for variation by making the vulcanizing process automatic instead of spasmodic. Uniformity results not from the skill or experience of the operator, but from the unvarying precision of the machine. The result: a uniform belt uniformly vulcanized and uniformly stretched, that will give uniform service.

The advantages of continuously vulcanized belts and the economy which they represent in the operation of your plant cost you nothing. BWH belts, made by this process, are competitive in price. You pay no premium for this extra measure of quality and service. It is only necessary to order belting by name and specify the BWH brand which best suits your service requirements.

BOSTON WOVEN HOSE AND RUBBER COMPANY

BOSTON WOVEN HOSE &

CONTINUOUS VULCANIZATION

BETTER BELTS

BULL DOG

For the severest requirements of drive and endurance. Extreme and uniform flexibility to meet difficult driving conditions. The gold standard of belt value. No drive too hard. No service too severe.

WARRIOR

Built of special 32-oz. duck, folded construction, highly resistant to stress and strain, and with high quality friction between the plies. For hard general use where sturdy and consistent performance is required.

PERFECTION

Built on a proved principle — many plies of relatively light-weight duck instead of a few plies of heavy duck. Widely used in the lumber industry on woodworking machinery; also for motor fan and centrifugal pump drives.

The above belts are made in all standard widths and any number of plies to meet specified conditions. Made endless if desired.

& RUBBER COMPANY CAMBRIDGE MASS. U.S.A.

See page 842.

Green Bay . . . Host City to Tappi

TRADE WINDS

EXPANSION WORK UNDER WAY AT SCOTT PAPER COMPANY

WORK has already been started on new additions and improvements at the Scott Paper Company, Chester, Pa., which firm recently made public offering of 30,000 shares of $4.50 cumulative preferred stock, no-par value, in order to finance the expansion program now taking place.

The funds to be raised by this financing are to cover the cost of improvement of riverfront property by erection of a wharf, pulp handling equipment and dredging; erecting a building on the site to house a new paper making unit; purchase and installation of one new paper making unit and auxiliary equipment; additions and improvements to water intake and filtration system; purchase and installation of an additional 650 pound pressure boiler, evaporator, a 5,000 kw. steam turbo-generator and condensing equipment and other alterations and improvements to the steam generating and electrical power plant; erecting an addition to the building housing finishing operations; purchase and installation of additional finishing equipment; enlargement of the present office and rebuilding the No. 11 paper-making machine. Also included in the expenditures are engineering fees and reserve for contingencies; purchase of 400 shares of common capital stock of Brunswick Pulp and Paper Company and expenses incidental to issuance of preferred stock.

The new paper machine is being constructed by the Beloit Iron Works, Beloit, Wisconsin. The preparation of the site for the new paper machine and finishing buildings has now been going on for a period of about seven weeks. While not all the contracts covering the expansion program have been signed, firm prices have been obtained on all major items of equipment and are being considered.

PLAN SEA WALL FOR HOLYOKE

The first step towards the construction of a $1,500,000 sea wall at Holyoke, Mass., for the protection of paper and other manufacturers whose plants are along the Connecticut River, were taken recently when two drill rigs were set up by the field force of U. S. Army Engineers along the river behind the Crocker division of the American Writing Paper Corporation. The rigs are being used to make test borings and take samples of the earth side of the raceway. The survey will supplement other surveys and upon completion make possible the immediate construction of the city's long-hoped-for sea wall.

Four test borings were made at every tailrace from the Holyoke dam on. As borings for each tailrace were completed the samples of the earth and rock that were taken continuously were sent to Providence, R. I., to allow detailed design of the sea wall on the basis of these samples.

Once rock was struck, diamond bits were used to bore into the rock and samples were taken of the rock borings. All these samples of earth and rock provided an accurate cross section of the earth at the point where the sea walls will cross the tailraces and allow complete design of the construction problems.

Most interested in this work are the mill owners for some have already stated that they may reject the scheme if construction of the wall across their tailraces would mean closing down the concerns for too long a period. On the contrary, other manufacturers have advised that if they are subject to another flood such as occurred in March, 1936, they will be forced to move from Holyoke.

This picture shows the tailrace behind the Crocker division of the American Writing Paper Corporation where it empties into the Connecticut River, flanked at left by a drill rig set up by army engineers. At the right, under the umbrella, an engineering level is set up.

NEW METHODS AID SULPHITE PROCESS

Improved technique developed at the Forest Products Laboratory, U. S. Forest Service, Madison, Wis., makes less imperative careful selection of heart-free wood, heretofore a requisite for light-colored, bleachable sulphite pulp from such woods as Douglas fir,

jack pine, and the southern pines. Wood containing considerable amounts of heartwood of the above species have produced satisfactory pulps by using the standard sulphite process under special conditions involving the use of high liquor concentration, extended penetration periods, and low temperatures in cooking the wood. These measures have tended to minimize the adverse influence of the heartwood, and in repeated instances gave satisfactory pulps from the standpoint of both yield and quality.

Although the results thus far obtained require further study to determine their full value both from a technological and economic point of view, they are considered particularly encouraging in view of the eventual possibility of making sulphite pulps suitable for high-grade papers, rayon, and other derivatives from heart-containing Douglas fir and pines.

◆

PAPER MACHINE FOR KALAMAZOO PAPER COMPANY

The Kalamazoo Paper Company, a firm which in 1867 produced the first paper made in Kalamazoo, Michigan, will soon have the newest paper machine in the Kalamazoo valley area, it was announced recently. An estimated $400,000 will be spent toward modernization of the No. 1 mill, it was disclosed by President Alfred E. Curtenius.

A machine from Rice, Barton & Fales Company, Worcester, Mass., to cost about $250,000, an enlargement of the building, together with lesser modernizing operations, will account for the total expenditure. It is expected that the new unit will be in operation by about February 1.

◆

PLANS NOW UNDER WAY FOR SPRING PAPER FESTIVAL

The general advisory committee for the pine pulp and paper festival to be staged in Savannah, Georgia, in April of next year, has already been appointed, it was reported recently.

The committee, which will function in a general capacity, will have as one of its first duties the selection of a sponsoring committee which is planned to include representatives from mills all over the South. J. H. Allen, vice-president and general manager of the Union Bag and Paper Corporation, is a member of the committee.

The theme of the festival will be the development of paper and its many uses. Exhibitions and lectures will graphically portray the process of pine to paper. A brilliant carnival, replete with historical features and gaily-decorated floats, will be one feature of the celebration.

While the immediate plans are for a gala three-day celebration, it is the intent of the interests sponsoring the event to make it a permanent affair taking place each spring.

◆

PORT ST. JOE TO CELEBRATE FOUNDING DATE

Port St. Joe, Florida, site of the St. Joe Paper Company, will celebrate the 100th anniversary of the framing of the first constitution of the State of Florida, December 7, 8, 9 and 10.

In a special edition of the *Port Saint Joe Sentinel* much of the history and commercial progress of the city was recently described in a pictorial manner. Several photographs of the St. Joe Paper Company mill were included. A description of the erection of the latter mill together with an account of the history of Port St. Joe appeared in the July, 1937, issue of the *Paper World*.

◆

CELLULOSE SALES NOW REPRESENTS SWEDISH PULP CO.

Just recently organized is the Cellulose Sales Company, Inc., 230 Park Avenue, New York City, which firm will represent the Swedish Pulp Company of Stockholm, Sweden.

N. R. Johaneson, president of Johaneson, Wales & Sparre, Inc., is president of the new firm. Other officers include K. J. Lundahl, vice-president; O. A. Wales, vice-president; P. G. Sparre, vice-president and treasurer, and G. M. Spencer, secretary. According to Mr. Johaneson, the entire staff of Johaneson, Wales & Sparre, Inc., will join the new company.

According to official announcements made by the Swedish firm, "It has long been the desire of The Swedish Pulp Company to conduct the major part of our business through one channel in the United States, believing that by doing so we could best serve the interests of our American customers." The Swedish Pulp Company manufactures annually approximately 350,000 tons of bleached and unbleached sulphite, 375,000 tons of kraft pulp and 200,000 tons of groundwood.

OPERATIONS ARE RESUMED AT THE WARD PAPER CO.

On Wednesday, August 17, the Ward Paper Company of Merrill, Wisconsin, resumed operations under new management, according to D. C. Everest, president of the company.

D. B. Smith, formerly with the Marathon Paper Mills Company, has been elected manager and secretary-treasurer. R. C. Johnson, formerly with the Northwest Paper Company, has been elected vice-president in charge of sales. Mr. Johnson maintains offices in the Conway Building, Chicago.

During the shut-down a number of changes were made in mill equipment. The mill will manufacture bleached sulphite specialties for conversion purposes and merchant stocks.

◆

GERMANY MAY BUY PULPWOOD IN ONTARIO

It is reported that pulpwood producers in Northern Ontario have been approached by representatives of Germany for the purchase of their stock. It is said that the price being paid is $11.50 per cord, which is high relative to the cost of production. It is understood, however, that specifications call for specially shaved wood.

According to present plans, the cut of pulpwood in Northern Ontario will not be more than one-third to one-half of last season as the Eastern mills are still heavily stocked with wood, due to 40 per cent curtailment in operations over the first few months of this year. It is expected that German interests will purchase over 200,000 cords of wood in Eastern Canada this year.

◆

NEW ENGLAND PULP

Frank opinion has been expressed by New England pulp buyers and even by some sellers that there is still room for some adjustment in wood pulp and it would seem that adjustment, in this case, means nothing more or less, than reductions.

The opinion has been found in many converting mill offices that bleached sulphite is too high compared to strong unbleached sulphite. Being buyers, these men do not, of course, say that unbleached is too low, an argument which any seller could support vigorously and effectively. However, the persistent talk along this line has aroused considerable discussion of a possible cut in bleached sulphite. It

is alleged that some imported pulp has sold down to $50 but there is certainly no general cutting of this kind. The point has often been made that differing qualities of bond and book sulphite justify a $5 spread between the high and low prices.

The weak unbleached market has been expressed in terms of sale at $38 to $42, the latter for one of the best brands, the former for a very strong and otherwise "fair" pulp. It can be stated with authority that at least 75 per cent of the converting mills are themselves opposed to any cut in pulp, and the self-contained mills would naturally oppose any such reduction. As one New England converter points out: "When sulphite was cut $5 last June, paper prices came down $10 per ton." That, unfortunately, seems the invariable result and no one is the gainer. It would also be entirely contrary to the general trend in commodity prices.

The kraft market is still unsettled by virtue of the large available and potential supply. Southern kraft has been offered at $35 delivered northern mills and imported kraft has been offered from $33 to $37 per ton on the dock for 1938 shipment. One of the better Swedish brands, however, has sold at $40 for 1938 and part of 1939.

◆

AWP COMPANY DRILLS FOR WATER SUPPLY

The American Writing Paper Corporation plant at Holyoke, Mass., is undertaking the drilling of artesian wells for cold water, it was reported recently. In confirming this report, Leon M. Yoerg, president of AWP, stated that spring-cold water makes a better grade of paper than does warmer water. How much of the present process water taken from the Holyoke Water Power Company's canals would be replaced by the new tapped source of water from deep in the earth is, as yet, unknown but it was said that it might displace a large quantity now taken from the water power company's canals.

◆

NEW PLANT FOR SUTHERLAND CO.

Another step in the expansion of the Sutherland Paper Company, Kalamazoo, Michigan, was begun last month when the company began construction of a new $180,000 plant for manufacture of paperboard specialties from roll stock.

To enhance the beautiful lawn in front of the Howard Paper Company, Urbana, Ohio, this marble fountain, imported from Italy several years ago, has been placed on the office grounds. Through this fountain flows the cool and refreshing water for which the location is noted. The water is so pure that it goes directly into the manufacture of paper without treatment.

The new plant should be ready about the first of the year and will relieve congestion of existing facilities and provide space for expansion in the paper specialty field. Miller-Davis Company, of Kalamazoo, has the general contract.

Rolls of paperboard stock from Sutherland machines will be borne to automatic machines in the new plant by an overhead conveyor system. Moving belts will take the output of the machines to the Packing Department, from which overhead tracks will transport converted specialties either to storage, to a 113-foot enclosed truck dock, or to a 200-foot carloading platform on a New York Central railroad siding.

The red-face brick exterior of the plant will be topped by a 10-foot ribbon of glass while the roof will be of pre-cast cement tile, insulated in construction. Other features will be air-conditioning, totally fire-proof materials, an automatic sprinkler system and individual lockers for employees.

◆

FIRE DAMAGES CANADIAN MILL

Damage estimated at between $50,000 and $75,000 was caused on August 8 by a fire which broke out at the Anglo-Canadian newsprint mill in Quebec City. Part of a covered conveyor was destroyed before firemen extinguished the blaze. The fire was believed to have been caused when a huge roll of newsprint, blocked in the conveyor, toppled over on an electric motor. Sparks from the motor ignited the paper and the flames were transmitted to the other stalled rolls.

CAN. PAPER FIRM IS INCORPORATED

Notice of incorporation of the Quebec North Shore Paper Co. was recently published in the *Quebec Official Gazette*. This is the company which takes over the holdings in the Province of Quebec of the Ontario Paper Co., the activities of which are centered at Baie Comeau on the north shore of the St. Lawrence, approximately opposite Rimouski. News print manufactured there goes exclusively to the *New York News*, the plant not competing with the open market with the other mills in the Province.

The Quebec incorporation follows Premier Maurice Duplessis' idea that companies using the natural resources of the province should come under Quebec laws. One of the results of the change is that the Province is securing some $250,000 under the heading of transfer dues, most of which was paid last June.

The capital is $12,500,000. The incorporation grants the necessary powers to the company to carry on all operations in connection with an enterprise of that nature, including water power development, steamship lines, house building, etc.

That the company does not wish to be exclusive in its own territory but prefers a prosperous community is indicated in the following authority given in the letters patent: "To aid and assist by way of bonus, guaranty, advances of money or otherwise, with or without security, settlers and intending settlers upon any lands belonging to or sold by the company or in the neighborhood of said lands, and generally to promote the settlement of such lands."

Hammermill Agents meet for Twenty-Seventh Annual Conference

HAMMERMILL AGENTS HOLD 27th ANNUAL CONFERENCE

ONE hundred and twenty paper merchants met with mill officials on August 25 and 26 at the twenty-seventh Annual Conference of the Hammermill Paper Company, Erie, Pa., with Hammermill Agents. Conference meetings were held at the Kahkwa Club during the morning while the afternoons were given over to golf and other competitive games.

E. R. Behrend, president of the Hammermill Paper Company, opened the sessions by stressing the importance of maintaining the principles that have guided the relationships of Hammermill and its agents for so many years. Norman W. Wilson, first vice-president and general manager, reviewed present conditions in the paper industry and H. R. Baldwin, vice-president in charge of sales, showed sales charts for each of the Hammermill papers and presented banners to the agents who have sold the largest tonnage of individual advertised lines in the past years. Mr. Baldwin conducted the general business and discussions of the meetings.

Bruce Barton, U. S. Representative, described the impressions of Congress he has gained during the past year to the Hammermill Agents. "I am not pessimistic," said Mr. Barton, "about the long term outlook of the United States."

The E. R. Behrend Golf Trophy was won for the coming year by E. R. Broderick of Muller and Phipps (Asia) Ltd., New York. J. M. H. Fitzgerald of Epes-Fitzgerald Paper Company, Columbia, South Carolina, won the Roger Brooks Taft Memorial Putter.

STURGEON FALLS PLANT YET UNSOLD

On August 22, Walter Cain, Deputy Minister of the Ontario Department of Lands and Forests, declared that the Sturgeon Falls and North Bay group negotiating for the old Abitibi Pulp and Paper Company plant at Sturgeon Falls, must improve their offer before the Abitibi receiver or the Department of Lands and Forests would approve the deal.

On the same day H. R. Gibbs, spokesman for the syndicate, stated that unless the Ontario Government approved within 24 hours the plans of the syndicate, the latter would take up an option on a mill site just outside the limits of Sturgeon Falls. The syndicate offer consisted of $12,000 a year rental for the plant and part of the taxes and insurance premiums.

As a result of the failure to arrive at a satisfactory understanding with the Abitibi receiver and the Ontario Department of Lands and Forests, the syndicate was dissolved. At the same time it was announced that there was a new project to erect a new groundwood mill at Sturgeon Falls. Mr. Cain pledged the co-operation of the Government, but counselled financial caution against any move which might aggravate the situation in the long run.

◆

MAY MAKE PULP IN CANADA FOR NEW TYPE FABRIC

Francis De Witt, of New York, who is the co-discoverer, with Paul Bryant, of a new fabric made from cellulose, recently stated that he considered Ottawa as a desirable point for the making of the base material or pulp, used in the process. The plant of Mr. De Witt's company is located in Worcester, Mass., and he stated that it is his intention to license a Canadian company.

Mr. De Witt referred to his product as the sixth fabric—cotton, wool, linen, silk and rayon being the other five. Products introduced through Mr. De Witt's processing are disposable and sell at less than the cost of laundering.

◆

▶▶▶ ERVING PAPER COMPANY, Athol, Mass., is considering purchasing a vacant tool room building of the former New Home Sewing Machine Company.

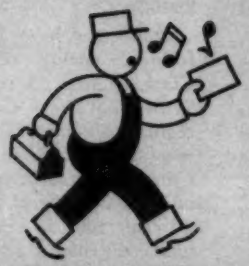
◆

SUCCESSOR TO HERTY UNNAMED

The naming of a successor to the late Dr. Charles H. Herty has been postponed, it was announced recently by Elliot W. Reed, secretary-treasurer of the Herty Foundation. This announcement was made following a meeting of the trustees August 6 at the home of Governor E. D. Rivers.

Mr. Reed said after the trustees discussed the matter at length at the meeting, it was the consensus of all present that since it was a matter of

ALWAYS ON THE JOB

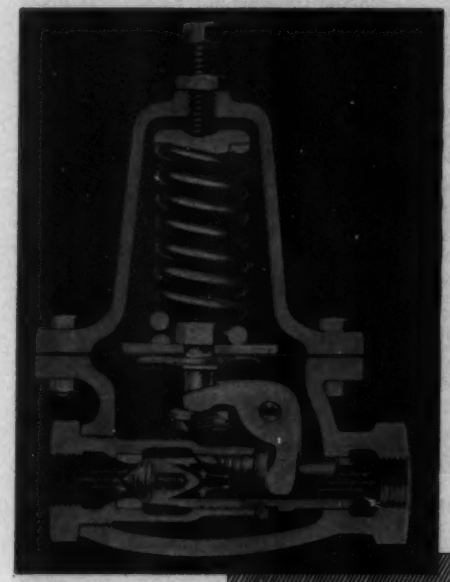


Reliable Valves Guard Against Loss of Time

Failure of one valve can often shut down a section of the plant. Maybe for a few minutes . . . maybe for hours. But even a brief halt in production is far more expensive than installing the best, most reliable valves obtainable.

Cash Standard Valves are designed and built to stay on the job—year in and year out. Their faultless performance is an important aid to efficient utilization of your investment in equipment and man-power.

The "Streamlined" Pressure Reducing Valve shown here is frankly, a high priced valve compared with some others. But in the long run, as proved by carefully kept records of maintenance cost, on a year after year basis, it is definitely a low priced valve.



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PRESSURE REDUCING VALVES

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As the sectional illustration and enlarged diagram show, modern principles of streamlining are correctly applied to the direct flow of fluid through this valve, with resulting increase in capacity and smoother control of delivery pressure.

Many advantages not touched in this brief outline are fully covered in a booklet describing the Cash Standard Valve and showing how it will help you eliminate costly valve failure. Write.

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such prime importance, time should be allowed for further consideration before naming a new executive director. The trustees voted to carry out the work of the foundation laboratory at Savannah, Georgia, under a five-year plan mapped out by the late scientist before his death.

Dr. Charles H. Carpenter, chief chemist and assistant to Dr. Herty, will continue operation of the laboratory.

•

C-W TO USE POWER FROM BONNEVILLE

The first industrial use of power from Bonneville Dam on the Columbia River between Oregon and Washington will be made by the Crown Willamette Paper Company mill at Camas, Wash. The Northwestern Electric Company, which serves the paper company, has contracted for 5,000 kilowatts for four months on an experimental basis. A pictorial account of the Bonneville Dam project appeared in the February, 1938 issue of *Paper World*.

•

FINANCIAL

WITH August paper production showing a material advance over the July output, which in turn was above the June totals, paper mill securities showed an appreciation by the public of the improving value of paper stocks and bonds. This, coupled with the reversal of the financial statements since the first quarter of 1938, indicated a partial return of prosperity. This trend, judged by the securities markets as a barometer was checked, temporarily at least by the European war scare, and the closing prices for paper mill securities in the last days of August, were in many cases somewhat under those for the end of June. An analysis of the securities prices, however, shows a materially higher trend in the building material securities, including building boards, reflecting the expectation that the W.P.A. activities will include an increase in building.

American Writing Paper Corp.—A loss of $81,085.15 for the first half of the year is reported as against a profit of $113,449.06 for the same period of 1937.

Crown Zellerbach Corp.—Net profit for the three months ending July 31 are reported as $970,055, equivalent to 13 cents per common share, compared with $2,507,711 for the same quarter of 1937.

Dennison Mfg. Company — Six months to June 31 net loss was $206,000, as against a net profit of $283,000 in the same period of 1937.

Dixie-Vortex Company — For the year ending June 30 net income was $812,519, or $1.80 per common share, compared with $2.28 for the preceding year.

Eddy Paper Corp.—Profits for the half year to June 30 were $69,345, or 39 cents per share as compared with $533,709 for the same period of 1937.

Flintkote Company—Net income for the twenty-eight weeks to July 2 was $269,627, or 40 cents per share, as compared with 98 cents for the same period in 1937.

Gaylord Container Corp. — Profits for the six months ending June 30 were $504,267, or 68 cents per share, compared with 30 cents for the second quarter.

Hinde & Dauch Company—Net profit for the first half year was $320,940, or 64 cents per common share, as against $809,006 for the same period of 1937.

International Power & Paper Company—The consolidated loss for the first half of 1938 was $701,116 as compared with a profit of $5,032,693 for the same period of 1937.

Ruberoid Company — The quarter ending June 30 showed a net income of $199,037, or 50 cents per share, as against a net loss of $193,758 for the previous quarter and a net income of $341,771 for the June quarter of 1937. Net income for the half year is 1 cent per share, as against $1.19 for the first half of 1937.

Scott Paper Company—Formal announcement was made in August of the offering of 30,000 shares of cumulative preferred stock, previously informally announced. The issue is offered at $104.75 per share, with interest at 4½ per cent, and is underwritten by a group of Philadelphia and Wall Street investment bankers headed by Smith Barney & Company and Cassatt & Company. The shares are redeemable at 110 in five years, and at 107 after that time, if called. The shares will be listed on the New York and Philadelphia stock exchanges. A new unit to cost $5,000,000 is projected, according to reports from Chester. Earnings in the first half of 1938 showed 21 per cent increase over the same period of 1937.

Union Bag & Paper Corp.—Net profit for the June quarter was $206,986, or 20 cents per share, as against $304,250, or 29 cents for the same quarter of 1937. An extension has been secured of bank loans and equipment notes of $3,681,937 incurred in building the two latest units of the company's Savannah plant. Since the first of the year the company has reduced its outstanding indebtedness $800,000.

Dividends have been declared as follows, among others: *Kimberly-Clark*, regular 25 cents on common; *Sutherland Paper Company*, 40 cents regular on common; *Nashua Gummed and Coated*, 25 cents on common; *Crown Zellerbach*, regular 12½ cents on common; *Great Northern*, regular 25 cents plus 12 cents extra on common. Dividend action was deferred on the common for the current quarter by *Soundview*, *Ruberoid*, and *Corrugated Paper Box* of *St. Louis*.

New York Stock Exchange—Stocks

	1938 Closing Sale July 30	Closing Sale Aug. 31
Celotex	23	22¼
Same Preferred	70	66½
Certain-teed Products	9½	10
Same Preferred	30	38½
Champion P. & F. Co.	28	*22–23⅞
Same Preferred	97¾	97
Container Corp.	——	15
Cont-Diamond	10½	*8⅞–10¼
Crown Zellerbach	13	12⅜
Same Preferred	——	78
Dixie-Vortex	13⅜	12
Same "A"	32¼	32
Robert Gair	4⅞	4¼
Same Preferred	16⅛	*12⅜–14
Inter. P. & P.	10	9⅛
Same Preferred	42½	39¾
Kimberly-Clark	29⅛	*26¼–29
MacAndrews & Forbes	30¾	*27–29
Masonite	48	52¼
Mead Corp.	14	12¼
Same Preferred	67	*66½–77
Paraffine Co.	48	——
Same Preferred	94	——
Rayonier	14⅜	11½
Same Preferred	22½	18⅜
Scott Paper	45¾	47¼
Union Bag & Paper	13¾	12⅞
United Paperboard	7⅛	7
U. S. Gypsum	87¾	97
Same Preferred	169	168

New York Stock Exchange—Bonds

Celotex 4½%	86	——
Certain-teed	76½	78⅜
Champion P. & F.	99	98
Container Corp. 5%	97	95¼
Inter. P. & P. 6%	89	85
Same 5%	97	——
Mead Corp.	104¼	103¾

New York Curb Exchange—Stocks

Am. Boxboard	11	*9¼–10
Brown Co. Pfd.	29¼	25¼
Detroit Paper Prod.	3¾	*2½–2⅞
Great Northern Paper	28⅞	29
Hummel-Ross	4⅞	*3⅞–4⅛
National Container	7⅞	*6¼–7
St. Regis	3¾	3
Taggart	6	*5⅛–5½
United Wall Paper	2⅜	2¼

*Closing Bid and Asked Prices, Aug. 31.

EIMCO offers

The Paper Industry Modern, New-Feature FILTRATION EQUIPMENT Embodying Many

Short Cuts to Longer Profits

FOR years before EIMCO came into the field, Filtration and Dewatering Equipment had lagged far behind other technical and mechanical developments in the paper industry. NOW Eimco has completely changed this condition by developing *Truly Modern, New Feature,* Continuous Vacuum Filters which not only cut initial and installation costs to new low levels, but also assure BIG SAVINGS in operating and maintenance costs.

Capacity and Efficiency* are both much higher than has ever before been possible—*Unequalled Precision* is assured in sheet formation and discharge—fibre losses in whitewater *average less than ½ lb. per thousand gallons.

All of the statements made above are based on *actual results* secured during nearly two years of highly successful operation at a well-known Northwestern plant, where carefully-kept records have more than verified all original expectations as to economy, performance, and quality of output.

ABOVE: Shop assembly of Eimco Saveall-Decker (without feed box) showing improved automatic valve with external controls, and compact float-operated variable-speed drive unit.

If you are interested in Savealls, Saveall-Deckers, High-Density Thickeners, Brown-Stock Washers, Bleach-Washers, or Lime-Mud Filters, let Eimco Filtration Engineers show you why our new-feature designs assure lower operating costs and better operating profits. Bulletins furnished promptly on request—estimates and preliminary designs involve no charge or obligation.

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Gentlemen: I am interested in your modern new feature continuous vacuum filters for paper-pulp service and would like to receive Bulletin 405, with the understanding that no charge or obligation of any kind will be incurred.

Name of individual *Position or title*

Name of company

Mailing address

NEW PAPER IS ANNOUNCED BY CONSOLIDATED

A new paper, "Production Coated E. F.", has been announced by the Consolidated Water Power & Paper Company, Wisconsin Rapids, Wisconsin. This paper, described as having been created for magazine, book, catalogue, pamphlet and advertising and printing, is completely coated on both sides, thereby, it is said, producing unusual halftone illustrations. This brand is a companion sheet to Production Gloss Coated, Consolidated's first coated book paper to be made and coated in one operation on a single machine.

◆

LAKE SULPHITE DEVELOPMENTS

The belief has been expressed that in the near future there will be a financial reorganization of the Lake Sulphite Company, Red Rock, Ontario, which some months ago went into liquidation. It is expected that within a few weeks definite arrangements will be made.

It is further understood that two groups are studying the factors in supplying the necessary capital to lift the receivership of the company and place the property in operation. A party of American interests, it is reported, investigated the affairs of the company, and it is said that they were impressed with the potentialities of the property to such an extent that they are willing to put up new capital to complete the project. A second group of Montreal interests has also been active along the same lines.

◆

NEW CREDIT PLAN FOR HEARST GROUP

Agreement has been reached as a result of conferences of representatives of newsprint companies, the banks and Hearst interests, whereby a new credit arrangement has been extended to the Hearst group in connection with newsprint purchases.

Under the new arrangements, newsprint is to be supplied to Hearst on a four months' credit basis. Canadian companies having contracts with Hearst include: Lake St. John Power and Paper Company, Brompton Pulp and Paper Company, Anglo-Canadian Paper Mills, Abitibi Power and Paper Company, Canadian International Paper Company, Mersey Paper Company, Donnacona Paper Company, and Donohue Brothers. The Hearst chain contracts for about $20,000,000 worth of newsprint annually.

◆

WASH. PAPER MILL DAMAGED BY FIRE

Fire believed to have been started by sparks from the chipper room threatened for a time to destroy the plant of the Columbia River Paper Mill at Vancouver, Wash., the night of August 6.

The blaze smoldered for several hours in the planking of the dock on which the mill is built before it broke into the open and was discovered. Fourteen firemen battled six hours to control the flames. Loss is estimated at $6,000 or $8,000.

BRIEFS

▶▶▶ ONTARIO PAPER COMPANY, through its subsidiary, the Quebec North Shore Paper Company, has awarded the contract for the erection of fifteen houses at Baie Comeau, Quebec, at an outlay of $80,000 or about $5,300 per unit.

◆

▶▶▶ HOW ONE INDUSTRY CONTRIBUTES to the well being of another was graphically shown recently when the Bethlehem Steel Corporation's expenditures in New England last year totalled $5,824,000 of which a substantial amount went for paper and paper products.

◆

▶▶▶ THE ABITIBI POWER AND PAPER COMPANY tug, Nipigon, was launched at Orient Bay August 25, the first of the 300-ton twins. The sister ship is expected to be launched early in October.

◆

▶▶▶ TILESTON & HOLLINGSWORTH COMPANY of Boston, Mass., were low bidders for supplying the State of Massachusetts with approximately 1,124 reams of ballot paper for the fall primary election.

◆

▶▶▶ BADGER PAPER MILLS, Peshtigo, Wis., is building a new warehouse for the storing of finished products, it was reported recently.

▶▶▶ IT WAS RECENTLY LEARNED that the option to purchase Anticosti Island in the Gulf of the St. Lawrence is still in force and is held by A. Meidle of Amsterdam, who interested a German syndicate in negotiations last fall.

◆

▶▶▶ THE SCHROON RIVER PULP AND PAPER COMPANY, Warrensburg, N. Y., will experiment with other stock other than hangings this season, it was reported recently.

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▶▶▶ THE OXFORD PAPER COMPANY earned a net income of $43,640 for the first six months of this year after all charges.

◆

▶▶▶ CANADIAN PRODUCERS of bleached sulphite are following with considerable interest, the results of experiments in the usage of rayon instead of cotton in tires. Prior experimentation has demonstrated the value of rayon as a substitute for cotton in heavy truck tires but it is now being adapted for use in passenger automobiles by the Goodyear Tire and Rubber Company and by the U. S. Rubber Company, it is said.

▶▶▶ DAMAGE DONE TO VALUABLE TIMBER is due to porcupines, according to lumbermen and pulpwood men who have assailed the animals as a destructive force. Formerly porcupines were protected under game laws as a source of food supply to woodsmen.

◆

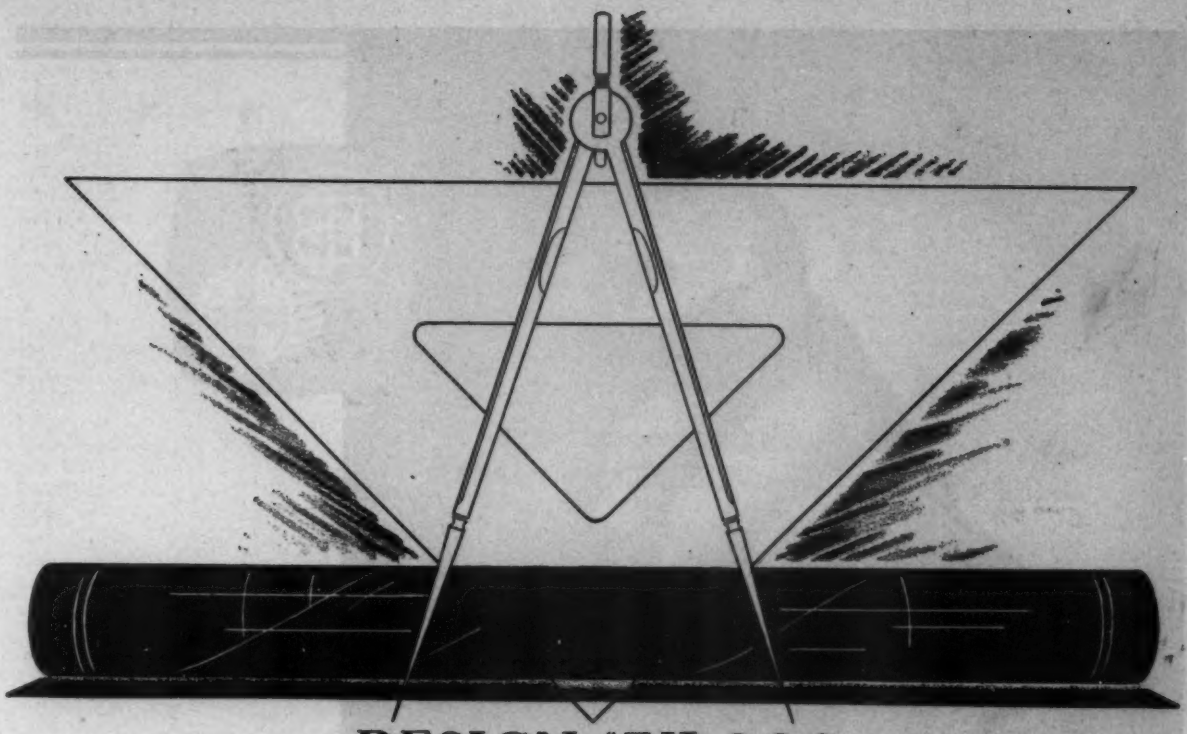
▶▶▶ THE FOURTH AND LARGEST RAFT of pulpwood to be conveyed across Lake Superior from Canada this year was received the first week in August at the hoist of the Marathon Paper Mills Company, Ashland, Wisconsin. The raft contained 15,000 cords of pulpwood.

◆

▶▶▶ A LARGE BOX FACTORY is to be built by Price Brothers Company, Ltd. The factory, already under construction, is being erected at Rimouski, Quebec. The plant will have a capacity of 1,000,000 wooden boxes annually.

◆

▶▶▶ THE EASTERN CONTAINER COMPANY of Holyoke, Mass., has leased from the Farr Alpaca Company of that city, a one-story brick building with about 10,000 square feet of floor space. Frank A. Gerarce, president of the company, announced that a paper machine will be installed in the new quarters. Corrugated boxes are the principal product at present.



DESIGN #ZK-OOO

By S & W — *for Progressive Mills*

When S & W engineers fashioned the Undercut ream cutter, they were shooting at two marks —safety, with more than ordinary efficiency.

Safety comes from the design. Gravity, itself, is a positive safety feature. And dual controls keep the operator's hands below the table. Accidental starts are impossible: There's less spoilage.

The always-aligned knife (which can be installed by one man) delivers a *straight* upward cut. No slipping, perfect lay, and easier pad work come from this vibrationless cut stroke. There is an equalized hold of clamp.

Some mills have purchased as many as 30 Undercuts for work on the finest grades of paper. Equal success is obtained on bindersboard, cardboard, etc.

Will your mill modernize? We'll gladly send you a bulletin on Undercuts. Just have your secretary write for it.

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Manufacturing 1828 *Company*

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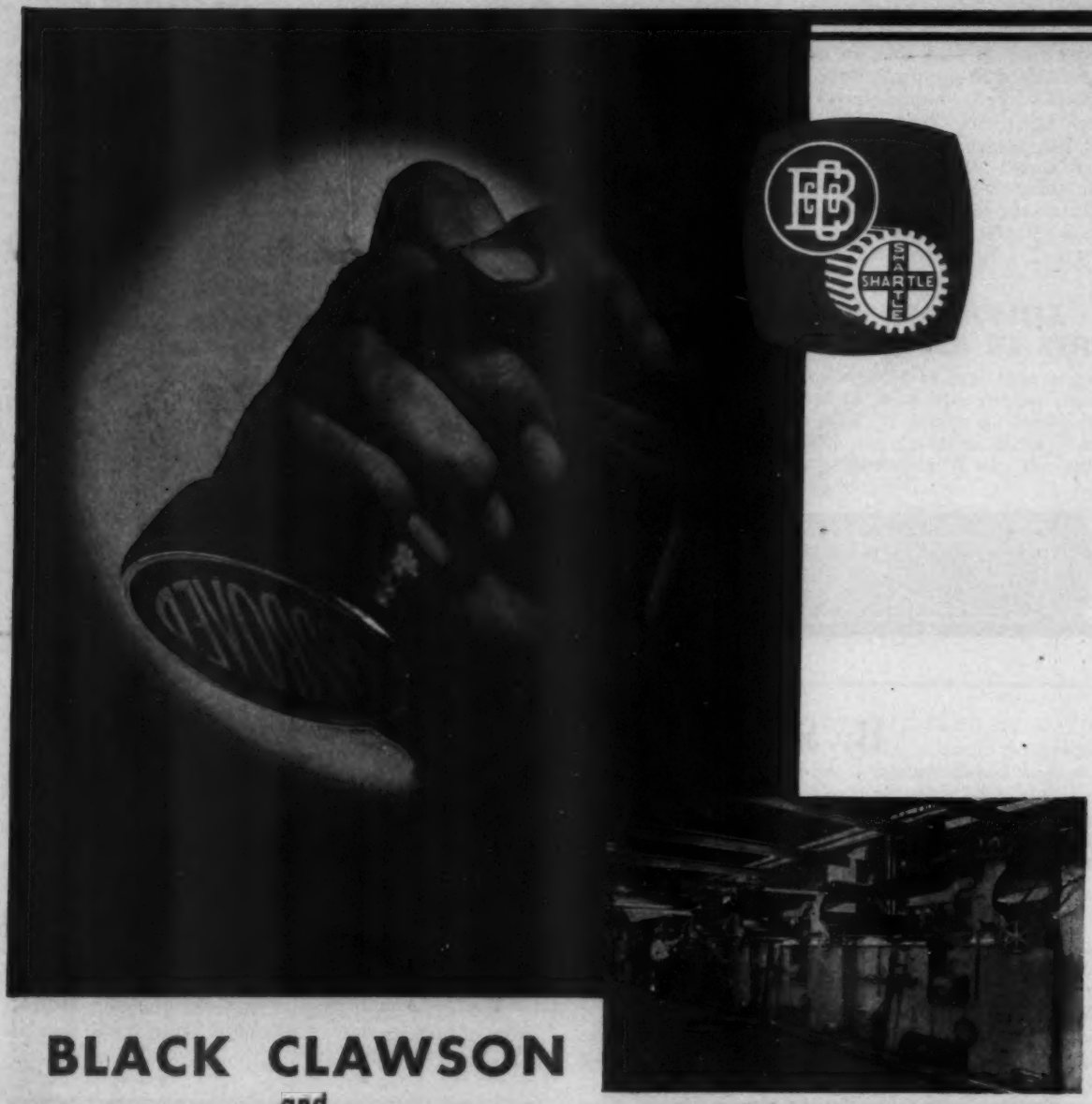
PLANT AND OFFICES AT SOUTH WINDHAM, CONN.



BLACK CLAWSON
and
SHARTLE BROS.

APPROVED . . . Several score vats in 22 mills in less than 5 years . . . that is the record of the new Black-Clawson vat. From every mill comes the report of greater formation control, higher speeds, smoother finishes, and savings on felting. • These results are the product of scientific designing and sound construction. For the same reasons, other Black-Clawson and Shartle Brothers paper mill machinery also have their definite advantages—also lead to substantial savings.

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★ ★ ★ ★ At NO extra cost ★ ★ ★ ★ ★

Buyers of PMC paper-making chemicals get 4 big advantages, at no extra cost, when they use PMC products.

1. **Highly trained sales and service representatives who are well acquainted with paper-making problems and their solutions.**
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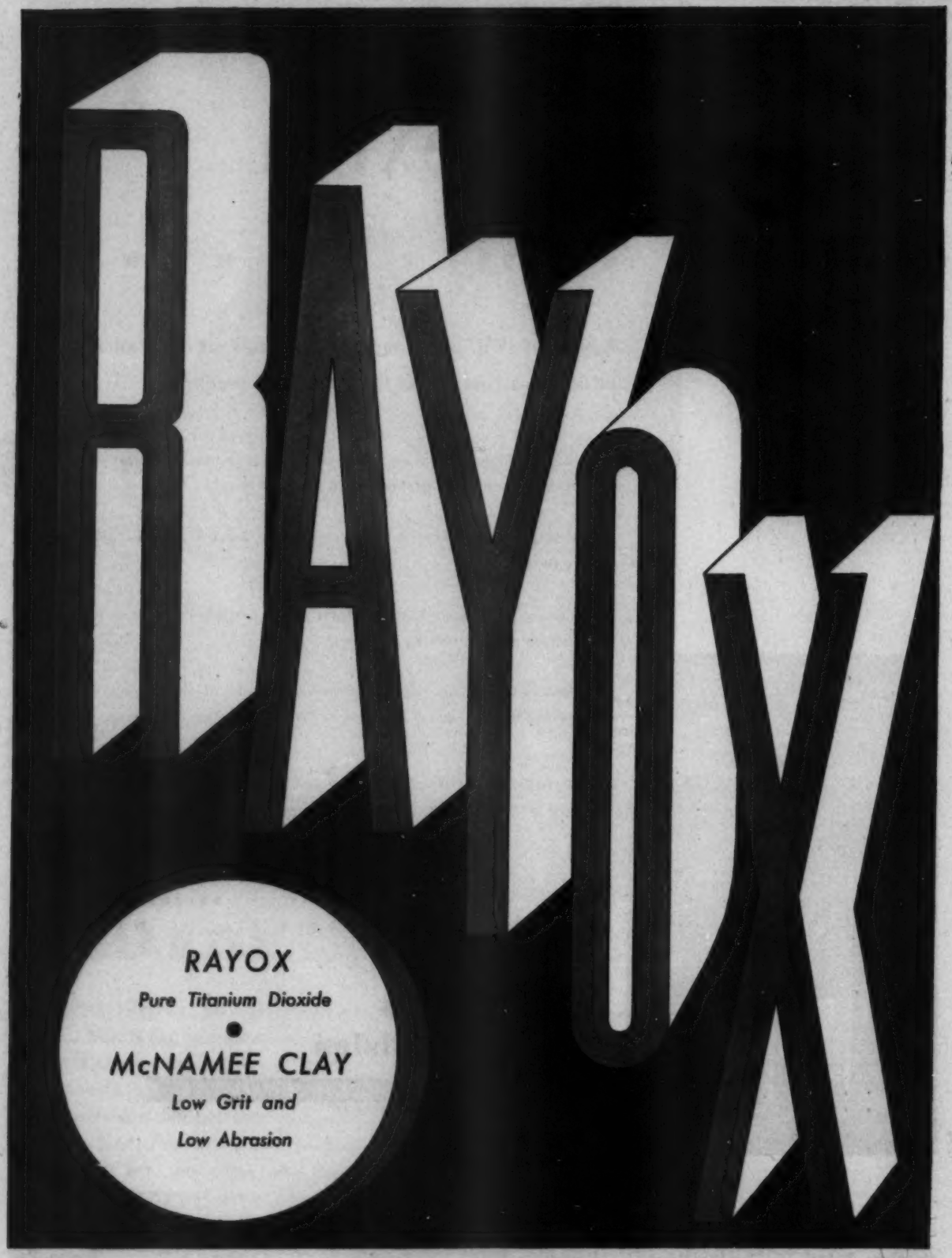
PM-57



R. T. VANDERBILT CO., INC • 230 PARK AVENUE, NEW YORK

Editorial ★ ★ ★

THE "PURGE" IS ON

▶▶▶ POLITICAL CONTROL of business has at last demonstrated its unfitness to stimulate sales and orders. Sales and orders are the factors which provide jobs for the unemployed, and the only way in which the unemployed may be re-employed is for business and industry to expand. Industry will only expand as the deadly interference by politicians with business progress is withdrawn.

Business has been defined as the interchange of goods and service. The continued sustained interchange of goods and services among the people in volume and variety is what makes for the continued material advance of prosperity by mankind.

This interchange of goods and services, the promotion of the same, always was the particular function of business and industry. Governing, or the political relations of men, municipalities and the State, is the particular function of politicians. For 150 years, this country has demonstrated to the world how wise the division of these two distinct departments of human operation is.

It is only in the past six years that a serious effort has been made in America to bring the promotion and guidance of business and industry under the control of politicians in Washington. That it has been a complete flop and failure finds its confirmation in the continued decline of business volume and the continued increase in unemployment.

Business in general, both big and little business, sensed the sinister drive by politicians for the control of industry in the fall of 1937—just a year ago this time. Since that date, business volume, which had averaged about 78 per cent of the 1926 business volume, during the eight month period from January 1 of that year, suddenly began to decline. It dropped from 79.7 for the week ending September 4, 1937, to 77.5, the following week and from that comparative high, it continuously declined by one to two points until it reached the low of 1938, of 56.9 for the week ending March 5. That record of sustained shrinkage of business volume in America was industry's message to the political administration in Washington to this effect—"We business men have no longer any confidence in the administration's effort to control and guide industry. We refuse to go along with you any further." That is as plain a mandate to the politicians to get out of business and keep out as though it had been blazoned in box car letters and thrown upon the sky for them to read.

It is impossible to fool all the business men all the time. They had been led up blind experimental alleys for the first five years of New Deal flounderings. But in this past year, business men of America have seen the light, got their bearings and are now out to control and guide business and industry for the recovery of prosperity in this country. There can be no prosperity until they succeed. To succeed, it is necessary to "purge" the halls of Congress of rubber stamp Senators and Congressmen.

That "purge" is proceeding right now and the slow upturn in business volume is entirely attributable to the confidence of more and more business men that the New Deal experiments are being stopped.

Again, we say, the restoration of business volume to this country is contingent upon the stoppage of political interference with the interchange of goods in volume and variety among the people.

The people have confidence in business to handle the business situation, and as that confidence is restored, business volume will expand and more and more people will be gainfully and respectably re-employed.

The fall elections will tell the tale.

▶▶▶ CALVIN COOLIDGE once related that when he was a boy in the hills of Vermont the only merchandise he saw was in the country store, but his horizon was broadened by the advertising of things that appealed to youth. With his desires aroused for the interesting and better things in life, he strove to obtain them. Asserting that advertising performs a distinct public service, Mr. Coolidge explained, "It is essential in the first instance to produce good merchandise, but it is just as essential to create a desire for it."

Better living comes not merely through natural desires, but through education, and advertising is one of the strongest forces in public education. Advertising is the salesman for better living.—*Bureau of Research and Education, Advertising Federation of America.*

THE COST OF A JOB

▶▶▶ TWO PAPER MILL ORGANIZATIONS within the past few months have published figures on the investment per employee in each of their respective establishments. One organization reported an investment of a little more than $8,400; the other approximated $8,000.

The two organizations are non-competitive. They are each producing a line of papers quite different from the other; but both are leaders. It, therefore, is quite interesting to observe the similarity in investment per employee in the two organizations, and to conjure on what the average investment per employee might be for the entire pulp and paper industry of the United States. In some instances, perhaps, it would be higher than the figures quoted; in others, it would be less.

Have you ever obtained this same information for your own mill or organization? If you haven't, it might be well to look into the situation. You might be surprised with the results.

Most certainly, the average employee has little more than a hazy concept of what investment has been made by the company for which he is working and through which his job and that of all his fellow employees has been made possible.

There might be some employees in the typical mill organization who are so uninterested in their jobs, or otherwise dissatisfied, that all they care about is what comes to them in their pay envelopes. It is believed, however, that such information accurately compiled and properly disseminated would make each employee more appreciative of his job and more willing to give his utmost to the success of the enterprise of which he is more than a cog, but rather a most important integral part.

CURRENT THOUGHT

RED INK IS MARCHING ON

WILLIAM SIBLEY

THE World War began in 1914. More than six times the amount of money will be spent this year for armament than was spent during 1913, one year before the recent great catastrophe. Louder than ever before in "peace-time" history, the anvils of Mars are ringing at Bethlehem, Carnegie, Manchester, Clydeside, Skoda, Krupps, Brest, Sasebo and Mitsubishi. Enlistment posters are flaming again on the main streets of the world. Men-of-war are glutting and blocking the shipyards of all principal ports. War planes darken the skies; photographs of marching men fill the Sunday supplements. Newspaper cartoons are constantly recurrent with the warning "Mind Our Own Business" and "Mind Your Own Business." Deepening fear of war spreads rapidly on the tidings of every, now frequent, crisis.

But nowhere is the distressed state of affairs in both the civilian and military world so accurately reflected as in the national budgets. Here is where we see the countless promissory notes entered against the unborn children's tomorrow. Here is where we see the long columns of red ink marching down the pages in the nation's ledgers.

Even though Germany, Japan, Russia and Italy (the totalitarian states) far out-distance all other nations in volume of war materials and in magnitude of expenditures for war, we here in the United States have vastly increased our military preparations and are now entered upon a plan to spend something more than 1¼ billions of dollars for our army, navy and air forces; over a half-billion for a "Second Deficiency Bill;" some thirty-four millions for ammunition and guns; and nearly 1½ billions for the construction of 153 fighting ships of various sizes, types and degrees of viciousness. Indeed, it is not too much to say that during the next four years we will have spent more than five billions of dollars as a peace offering to the God of War—if that much time yet remains before war attacks us (which may be doubted.)

But figures such as the above have little meaning for the average reader. Let's put them down to a point where we can understand them slightly better. All right then—between now and July 1, 1939, we will have spent $8.77 for every man, woman and child in the United States—on preparation for war. In England the cost, during the ensuing year, will be about $40 per capita. France comes forward with an estimated expenditure of $16.62 per capita. In Russia, the unit cost is lower than in that island which houses England, Scotland and Wales, but it should be remembered that its cost of $32.76 per capita is spread over 170 millions of people. Germany, including Austria, has a per capita annual cost of $35.62. In Italy, the cost will be somewhere in the province of $17.00. Japan follows with a projected annual cost of about $25 per person, while her present war is costing in the neighborhood of $3,000,000 a day. In China, due to unreliable census figures, the costs are beyond accurate determination, but it is known that today war is costing her in excess of $2,000,000 per day.

Poland is spending more than $200,000,000 per year in the preparation for war. Turkey has borrowed from England to buy and build armament. Czechoslovakia has mobilized several of her conscription classes and has entered upon a huge program calling for the erection of steel and concrete fortifications. Even South American countries, endeavoring to keep up with the jittery Joneses, have turned to both the United States and Europe for planes, ammunition and ships.

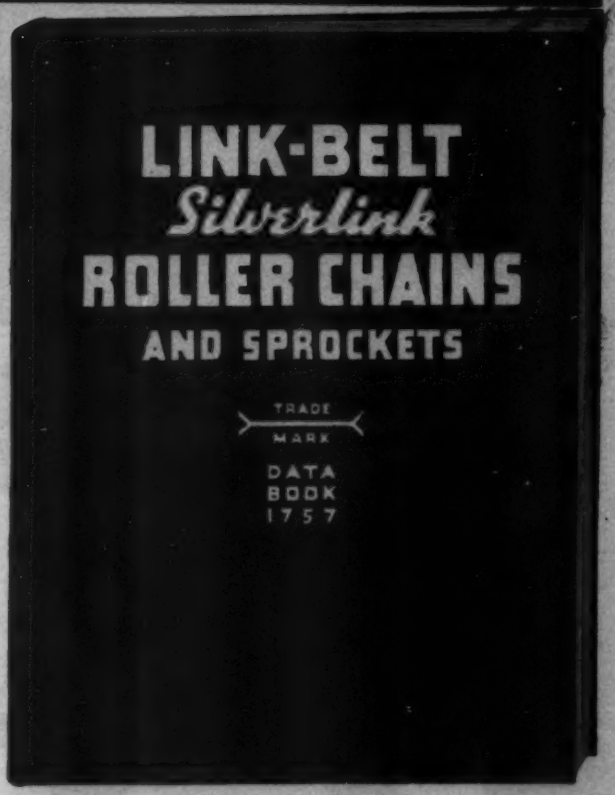
Throughout the world, whether it is in Europe, in the East, in Australia, in the United States or in Peru, all nations, large and small, are spending freely (almost eagerly) for the oncoming war. . . . Spending money at a rate never before equalled in "peacetime." This of course can mean but one thing. "Coming events cast their shadow before"—and when that event is war, the shadow is red ink spilled with abandon over the ledgers of every important chancellory in the world.

Ten years ago the world was sailing along a comparatively quiet, peaceful stream. Today we are tossing and bumping down the roaring rapids—and immediately ahead is the falls. And even here, in this most dangerous of all spots, we give every evidence of men afflicted with the St. Vitus dance, spending money for more sails with which to catch more fear-wind and thus hasten our progress to the edge of international suicide. With ever increasing speed we are nearing the brink of universal war.

Today, our case of international jitters has gone too far to be healed by the application of diplomatic salve. And this being true I have but one suggestion to make: Let the Government of the United States proclaim to all the world that not one musket, not one bullet, not one pound of powder, not one dollar of credit will be permitted to go from this country to any other country in the world until every penny of the World War debts (principal with interest) has been paid.

War, now as always, is a matter of red ink. The "victors" are invariably those nations who can absorb and withstand the greatest financial losses. To impose upon all nations the necessity for first paying the long over-due war debts might not prove a lasting panacea, but it certainly would be a body blow to those nations who are now feverishly spending money for armaments in the serene knowledge that when they run out of dough they can always turn to Uncle Sam. We have played the role of Uncle Bim in the past. From now on let's be Uncle Sam.

Send For This NEW 174-Page DATA BOOK



● Every probable question on the subject is answered in this authoritative manual on finished steel roller chains, attachments and sprockets . . . for power transmission and conveying applications. 174 pages of meaty, illuminating information—list prices, ratings and bed-rock figuring and design data. Information is given on many new chains, such as Twist-type drive chains, Universal Carrier, flat top and other extended pitch conveyor chains. Also a special section covering stainless steel, bronze and other alloy chains.

Your entire requirements for drives, conveyors and miscellaneous applications may be selected from this book. Send for a copy today. Use your business letterhead and ask for Data Book No. 1757.

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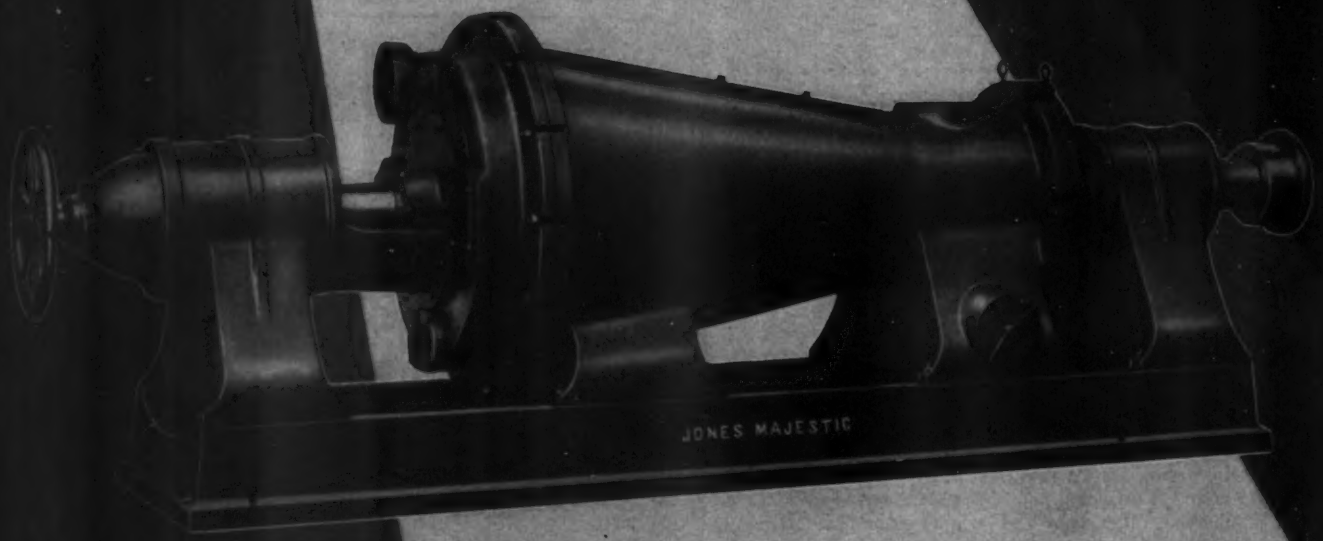
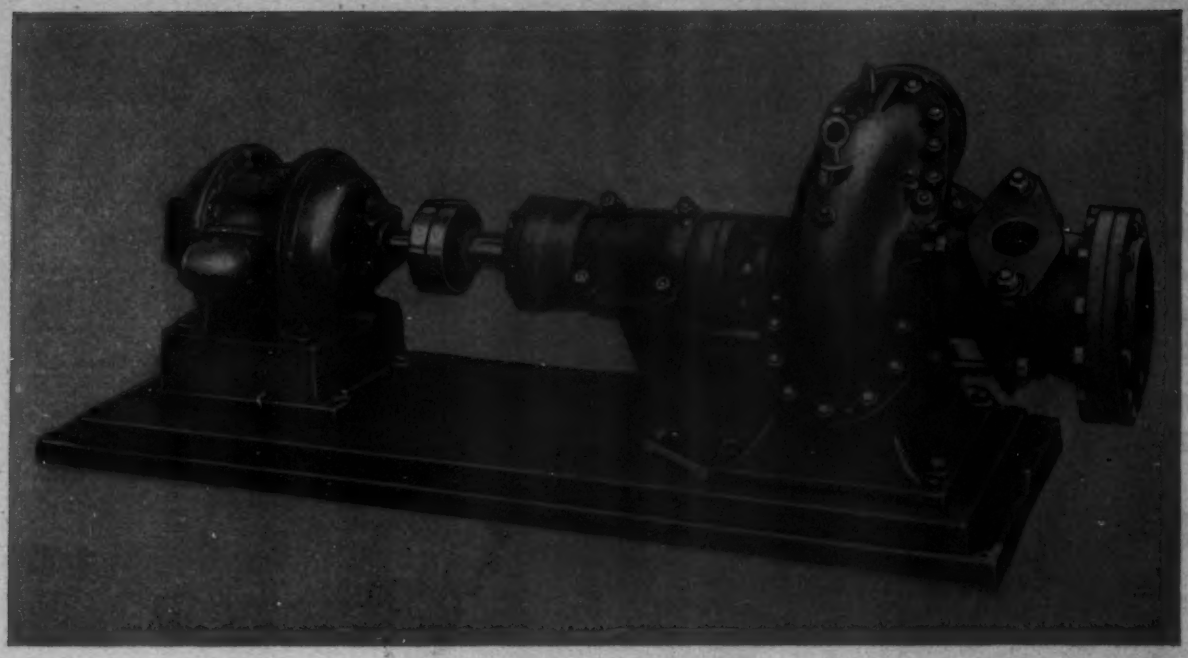


Jones

E. D. JONES & SONS COMPANY-PITTSFIELD, MA
Builders of Quality Machinery for Paper Mi



STRAWS

THAT COULDN'T BREAK THE CAMEL'S BACK

GOULDS Fig. 3105 Centrifugal Paper Stock Pumps are designed to handle stock up to 6% consistency. Yet in at least one mill, these pumps were put to work on stock that ran as high as 8%, yet these substantially built units did the job—and are still doing it—successfully in every respect!

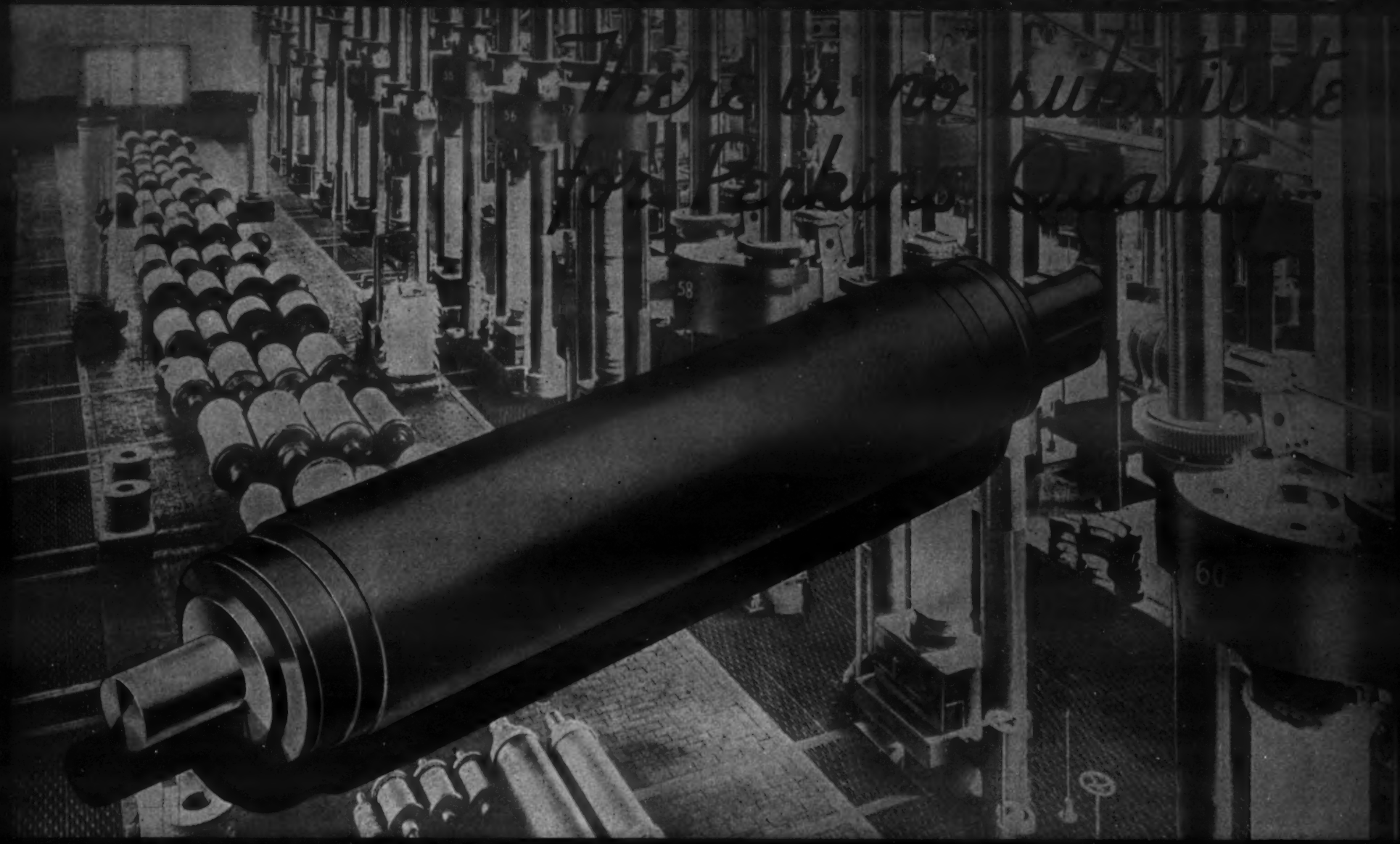
Such performances typify the Goulds line—a complete line of pumps for every requirement of the paper industry—built by a 90-year-old firm that has always maintained an intimate and specialized contact with the paper industry and its severe liquid handling requirements.

To standardize on Goulds is to assure maximum pumping economy. Bulletin 206, "Goulds Pumps For The Paper Industry", shows why this is so.

GOULDS PUMPS Inc.

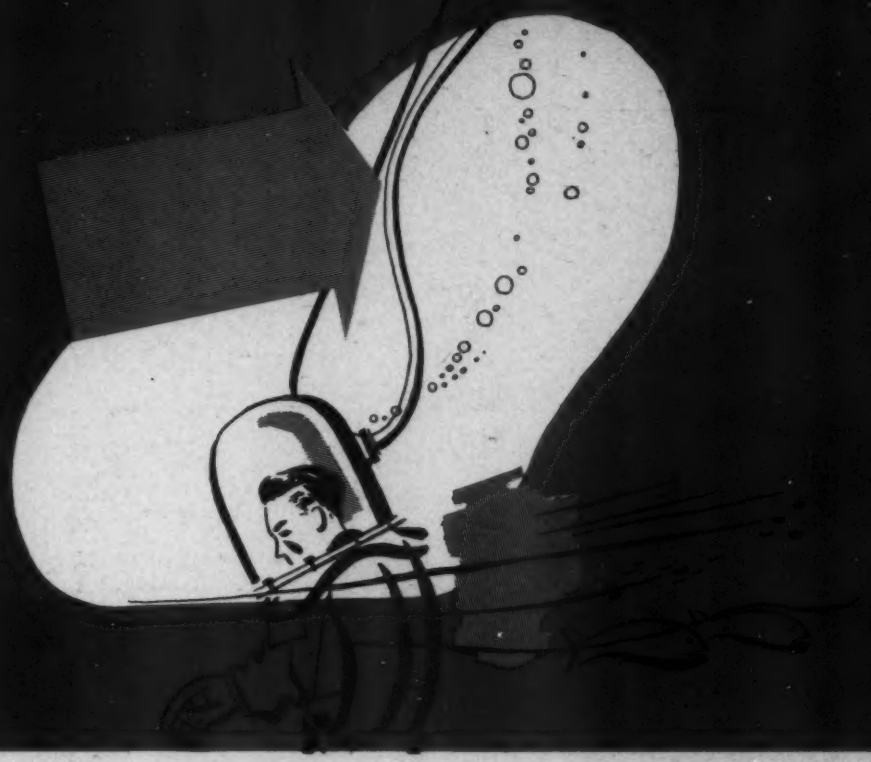
ATLANTA BOSTON CHICAGO HOUSTON NEW YORK PHILADELPHIA PITTSBURGH TULSA Representatives in all Principal Cities

PERKINS CALENDER ROLLS



R. F. PERKINS & SON Inc. HOLYOKE - MASS.

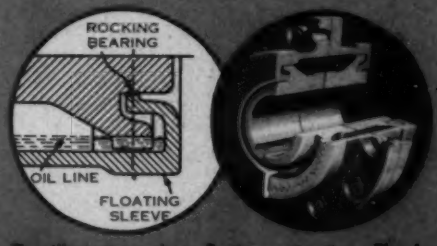
THE SUPERIORITY SHOWS UP IN PERFORMANCE



WHERE YOU CAN'T GAMBLE

The complete dependence of the diver on his equipment has a counterpart in modern plant operation. The shut-down of a single machine may stop production throughout. *Dependability* in the couplings takes on a new significance and explains the ever-increasing demand for Fast's, the original and genuine.

Fast's Couplings represent the unbeatable combination of correct basic design and controlled quality production. From features and refinements exclusive with Fast's come a performance that has won the confidence of countless users. Specify Fast's—there *is* no "equal." Koppers Company, BARTLETT HAYWARD DIVISION, BALTIMORE, MD.



The illustrations show Fast's construction. The load-carrying surfaces are protected from wear by a positive film of oil. This oil is kept permanently clean by the rocking bearings which make precise metal-to-metal contact and are in the one position where they form permanent dust and moisture proof seals. These vital features are found only in genuine Fast's Self-Aligning Couplings.

FAST'S COUPLINGS

a KOPPERS product

Dilts

Our close and intimate study of paper mill production systems over a period of many years has enabled us to gather much valuable information concerning production problems that beset the paper manufacturing field. With this information at hand, and with the knowledge that there was a need for a machine that would more efficiently and economically perform final screening operations, we have developed the Dilts built Cowles Vertical Classifiner.

By adapting the efficient screening and centrifuging principle of the Horizontal Classifiner to final screening operations, this new unit fills a long felt need in the paper making industry, and like other Dilts units, the Vertical Screen Classifiner can easily be adapted to work in with your present system.

The Dilts Engineering Service, backed by years of experience, is helping many paper mills solve their production problems. This service is always available to you, so call on Dilts whenever you are in difficulty.

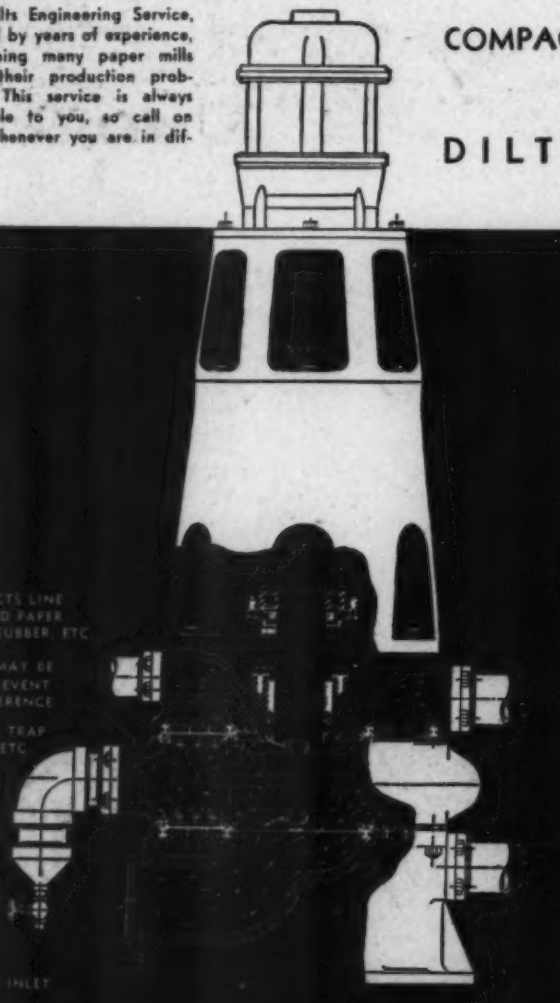
EFFICIENT:— A relatively clean screening zone is maintained due to the efficient centrifuging action. Heavy dirt and rejects are thrown to the outside, while the lighter rejects remain in the center, and all this trash is intermittently or continuously removed during operation. Moreover, the action of the scrapers in brushing stock through the screen plates affords an additional final refining action immediately ahead of the paper making machine, and the impellor action thoroughly mixes the white water and the stock, thus assuring a better formation.

FLEXIBLE:— Operation is equally efficient at low or high speeds and therefore a wider range of capacities is accommodated than is possible with the conventional flat or rotary screens. The efficient impeller design and centrifuging action makes it possible to screen stock of a much heavier consistency than has hitherto been possible, and at the same time part of the white water can bypass the Classifiner.

ECONOMICAL:— A saving in power consumption is effected due to efficient operation at low speeds. Pipe connections eliminate overflow and messy floors that are common with open type screens, and a screen attendant is unnecessary as the removal of heavy rejects is automatic. The machine is constructed so that it is easily accessible for inspection or repair and a battery of Vertical Classifiners can be served by one overhead trolley.

COMPACT:— There is a saving in floor space of approximately 75% of that required of other machines that perform the same operation. The compactness of the unit makes less piping necessary and a battery of screens can be driven from one line shaft.

DILTS MACHINE WORKS, Inc.
FULTON, N. Y.



VERTICAL SCREENING

COWLES VERTICAL CLASSIFI
Built by
DILTS MACHINE WORKS, IN
FULTON, N. Y.

Here It Is! THE ANSWER TO ONE OF YOUR TOUGHEST PROBLEMS. ARE YOU TAKING ADVANTAGE OF IT!

THE 100% MECHANICAL PIPE CLEANER

PAT. IN U. S. A. & CANADA

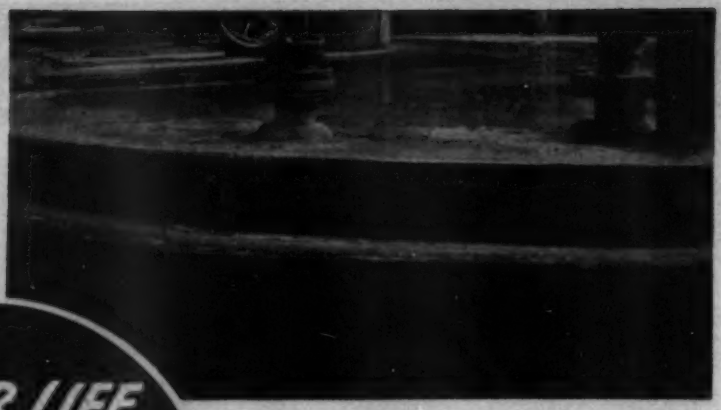
Whirlflex

ELECTRIC POWER
POSITIVE CLEANING

REMOVES EVERY SPECK OF DIRT
DOWN TO THE BARE PIPE MATERIAL

ENTHUSIASM IS THE RULE WITH WHIRLFLEX OWNERS.
OUR CLAIMS HAVE BECOME THEIR FACTS!

Whirlflex Sales, Inc., 801 White Bldg., Buffalo, N. Y.



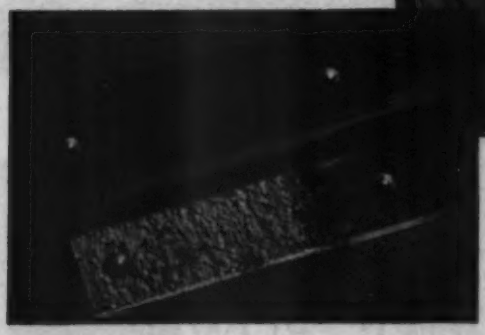
LONGER LIFE
for your tank linings, coils and pipe
TELLURIUM LEAD

NO REPAIRS

Tellurium Lead is now extensively used for coils and pipes and to line tanks in plants handling corrosive acids. One manufacturer who has used Tellurium Lead in a dilute sulphuric acid solution writes: "Coils previously used gave comparatively short service (about six months). Tellurium Lead coils have been operating continuously 24 hours a day for a year. As yet no blow-outs have occurred nor have any repairs been necessary."

MORE STRENGTH AT BENDING POINT

When bent, stretched or hammered, Tellurium Lead actually becomes stronger. Result—turn-over points and joints are less subject to cracking. Furthermore, where vibration occurs, this capacity to develop latent strength minimizes buckling and creeping.



LESS CORROSION

"We lined one of our tubs with your Tellurium sheet lead. After eight months, there are no signs of the lead creeping and it shows very little if any corrosion due to the action of the 10% boiling sulphuric acid. It promises to have a much longer useful life than the lead previously used."

New Low Price Now in Effect

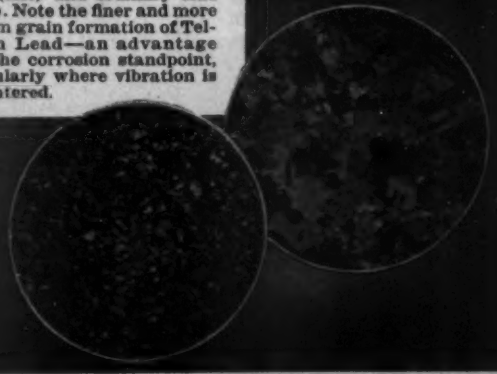
GREATER ACID RESISTANCE

Illustration above shows strips of lead with and without tellurium content after immersion in 96% sulphuric acid at 305° C for 3 minutes. Tellurium Lead weight loss, 0.97% — other lead 5.11%. Laboratory results such as this have now been verified by plant service in many industries.

Tellurium Lead of our manufacture is time-tried St. Joe chemical lead alloyed with a small quantity of Tellurium. It gives the advantages of this well-known chemical lead plus important new ones. Yet now, due to a price reduction, it costs only a fraction of a cent more per pound than chemical lead. Available in sheets, pipe and coils. For further facts, write to nearest branch.

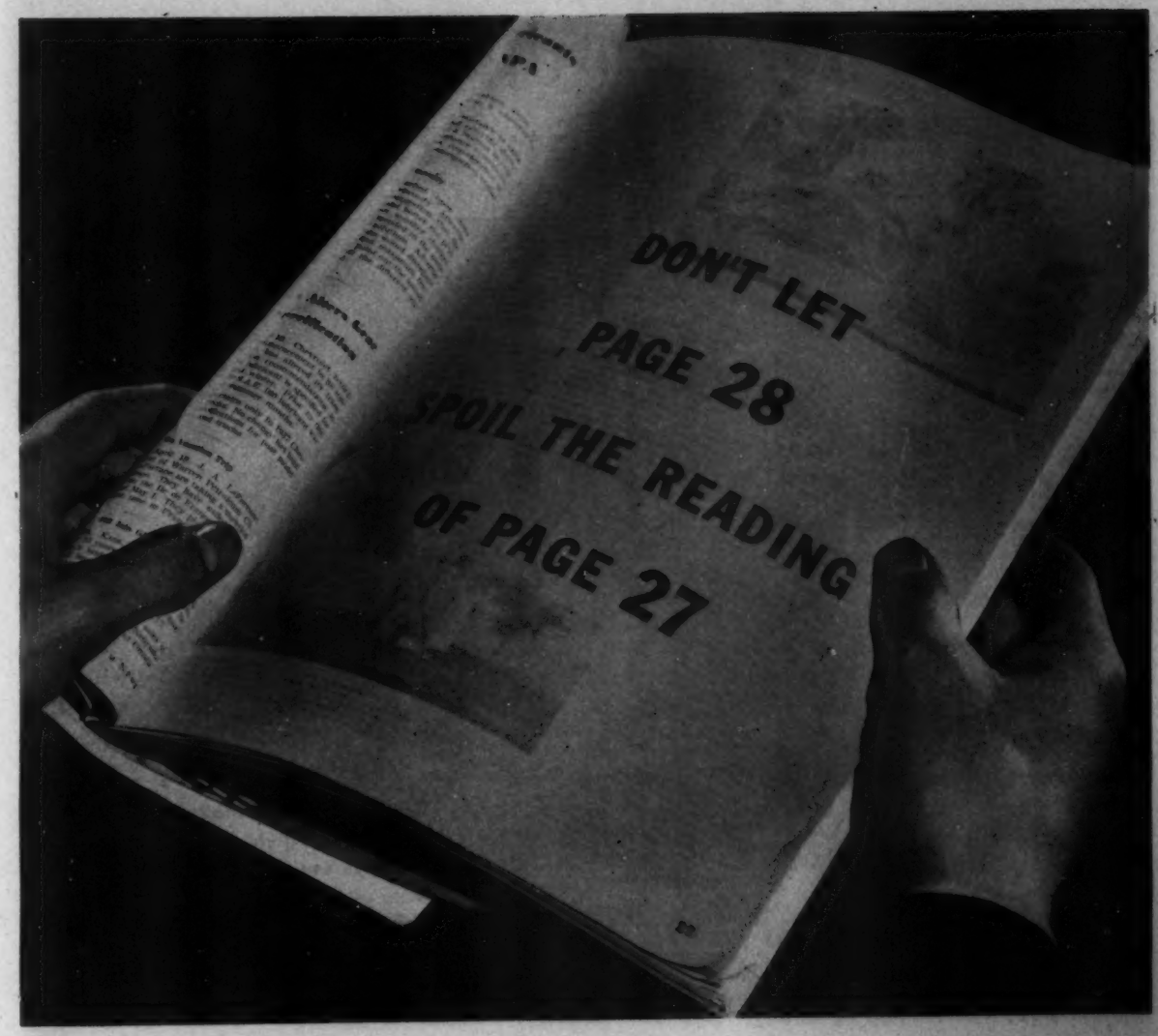
DENSER STRUCTURE

Photomicrographs of Tellurium Lead (left) and ordinary lead (right). Note the finer and more uniform grain formation of Tellurium Lead—an advantage from the corrosion standpoint, particularly where vibration is encountered.



NATIONAL LEAD COMPANY

New York, Baltimore, Buffalo, Chicago, Cleveland, Cincinnati, St. Louis; National-Boston Lead Co., Boston; John T. Lewis & Bros. Co., Philadelphia; National Lead & Oil Co., Pittsburgh; Georgia Lead Works, Atlanta; Gibson & Price Co., Cleveland; American Lead Corp., Indianapolis; Master Metals, Inc., Cleveland; The Canada Metal Co., Ltd., Toronto, Montreal, Winnipeg, Vancouver.



KREBS PIGMENTS PREVENT "SHOW-THROUGH"

even on thin paper

PAGE 27 looks messy and is hard to read if the type and illustrations on page 28 show through the paper. It's easy enough—and economical, too—to keep these shadows out with Krebs pigments.

These pigments make any paper whiter, brighter, and more opaque. Even the thinnest sheet gives sharp, easy-to-read printing *on both sides* when it's made this modern way.

Find out how simple it is to shadow-proof your papers with Krebs pigments. Full information will be sent on request.

Krebs also offers high quality colored pigments for use by the paper industry.

KREBS

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KREBS PIGMENT & COLOR CORP.

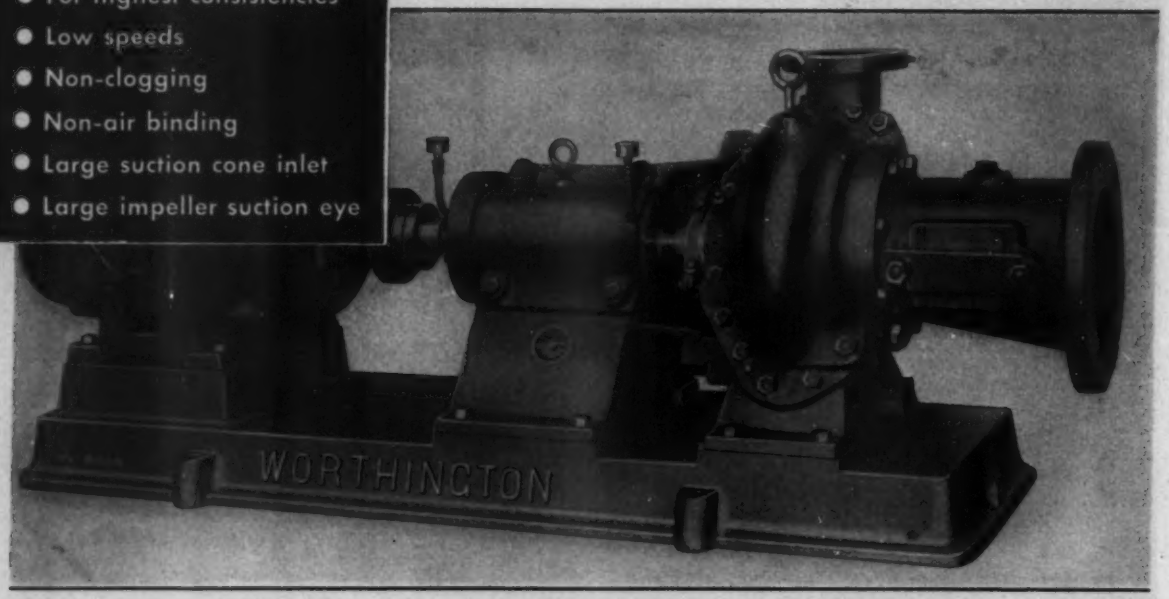
1007 ORANGE STREET

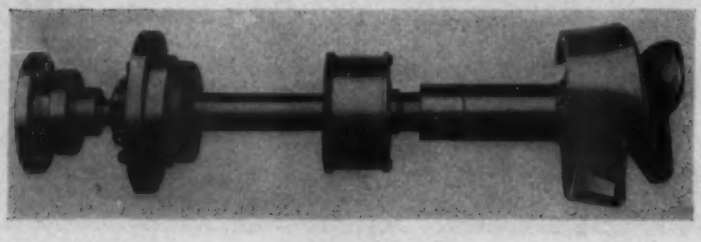
WILMINGTON, DELAWARE

Worthington Centrifugal Paper Stock Pumps

Exclusive features:

- For highest consistencies
- Low speeds
- Non-clogging
- Non-air binding
- Large suction cone inlet
- Large impeller suction eye





Combined screw-conveyor radial-vane type impeller gives positive displacement and assures approximately constant capacity at variable suction heads.

100% open, front and back... no binding by air or stock... positively non-clogging. Suction head pressure on stuffing box.

IN addition to the Type FP Paper Stock Pump, Worthington builds a complete line of equipment to meet all the pumping requirements of pulp and paper mills and their power plants. Following are some of the major applications.

General water supply	Acids, caustics, sizing, colors
Grinder pressure, hydraulic pressure	Black, green, white and wash liquor
Showers, white water, stock	Digester circulation
Boiler feeding, fire protection	Corrosive and abrasive fluids
Circulation condensers, evaporators	Lubricating oil transfer
Condensate and vacuum	Sump drainage

• Literature on any Worthington equipment furnished on request

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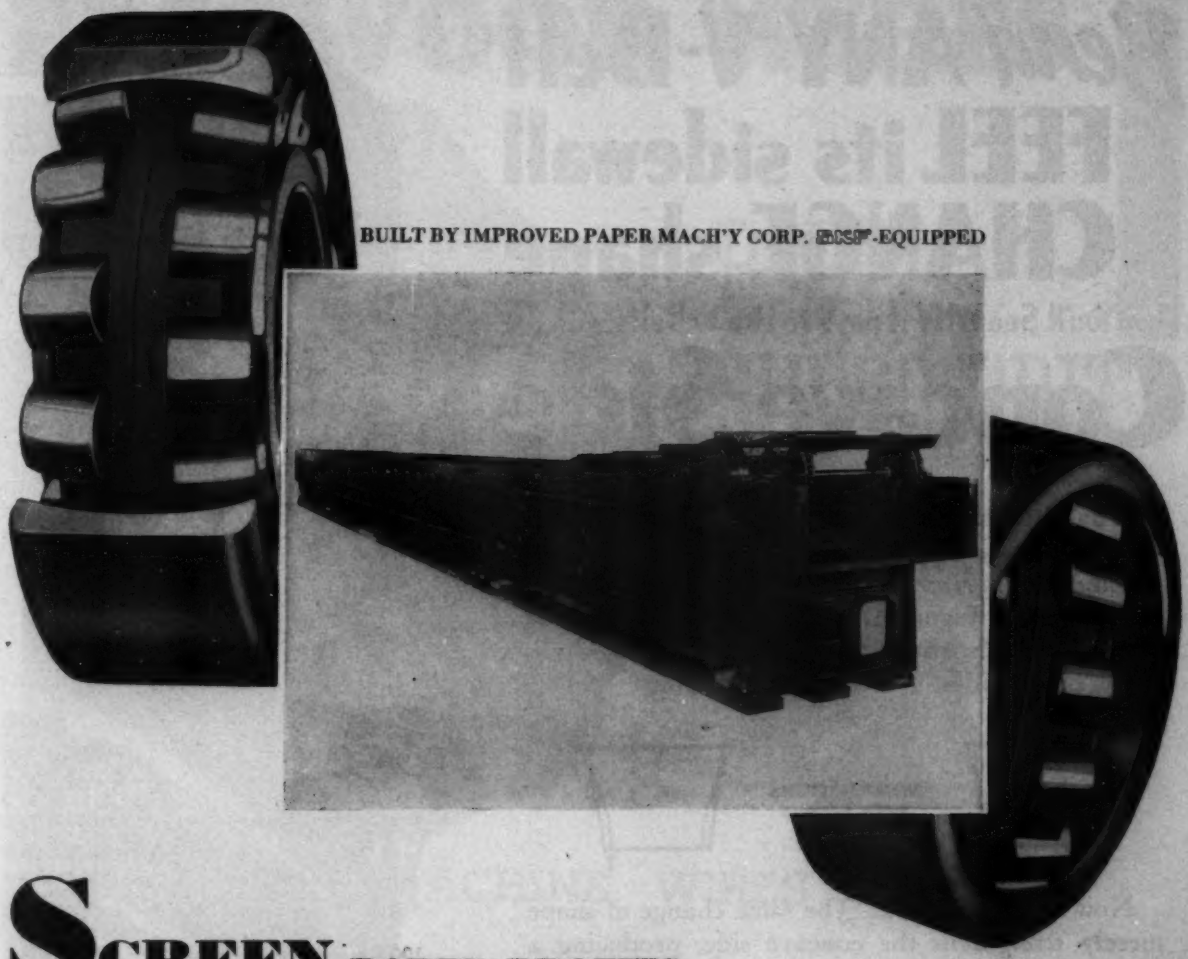
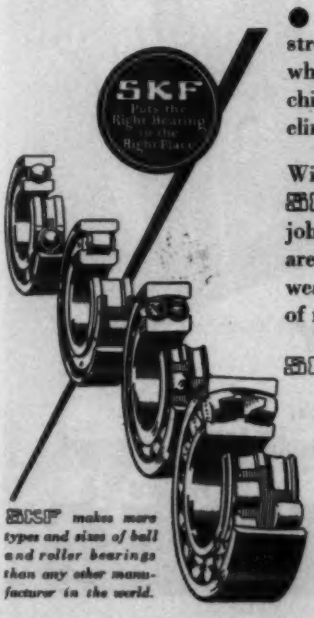


BUILT BY IMPROVED PAPER MACH'Y CORP. SKF-EQUIPPED

SCREEN PAPER PROFITS

WITH SKF PLUS-PERFORMANCE



SKF makes more types and sizes of ball and roller bearings than any other manufacturer in the world.

● Day after day the fibres of great trees flow in a thick milk-white stream of pulp over this Impco Flat Screen. And at every point where there's a bearing on the drive shaft and eccentric of this machine, there's an SKF Spherical Roller Bearing reducing friction, eliminating power waste and minimizing shutdowns.

With their equalized load distribution, high capacity, and long life, SKF Spherical Bearings have proved their merits on the tough jobs of the paper industry. Made from the finest chrome steel, they are hardened throughout for maximum strength and resistance to wear. Is it any wonder, then, they have won the universal approval of men who make paper?

SKF INDUSTRIES, INC., PHILADELPHIA, PENNA.

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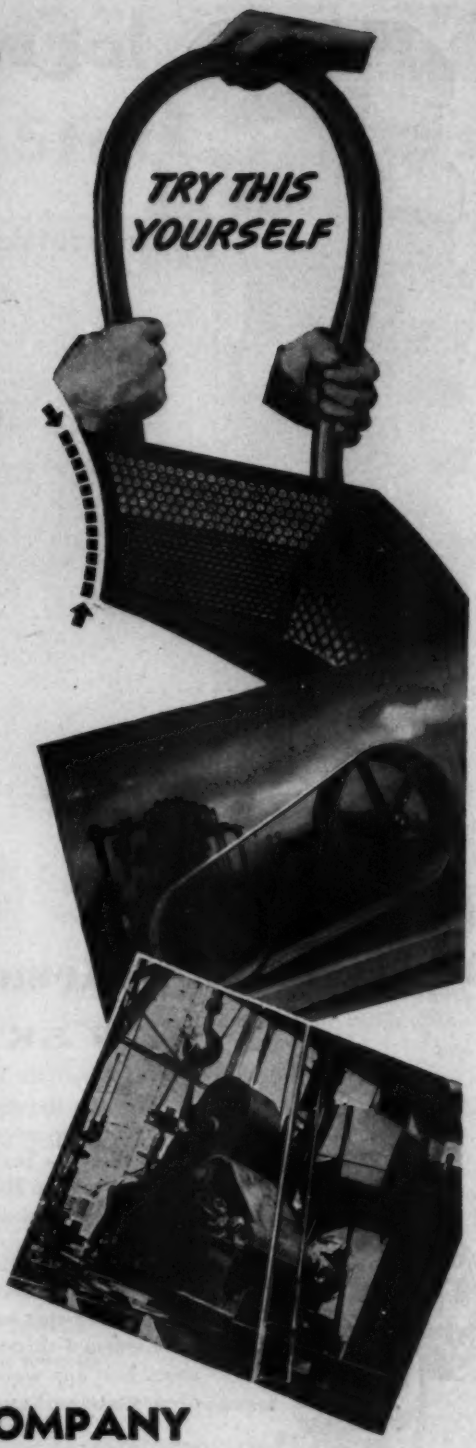
SKF

BALL & ROLLER BEARINGS

Bend ANY V-Belt FEEL its sidewall CHANGE shape

Then You'll See WHY it pays to Use V-Belts with the Concave Side



You can easily *feel* the sides of any V-belt change shape as it bends. The top of the belt is under tension and *narrows*. The bottom, under compression, *widens*. Figure 1, below shows the resulting shape-change in a straight-sided belt. Note the out-bulge of the sides.

Now look at figure 2. The same change of shape merely *straightens* the concave side, producing a contour that *precisely* fits the sheave groove. Two big economies result: (1) No out-bulge at the side means uniform wear—*longer life!* (2) Full side-wall grip on the pulley holds heavier loads without slippage—a big increase in drive efficiency—saving belt wear and also saving *power!*

The Gates Vulco Rope is the only V-Belt built with the patented concave side.

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GATES VULCO ROPE DRIVES

EASTWOOD WIRES

POINT SUPERIORITY

as the Compass points Direction!

MACHINE WIRES have been our especial job for more than fifty years. We have learned materials and methods • Mill men agree on our product Value and Service.

EASTWOOD MAJORS IN WIRES

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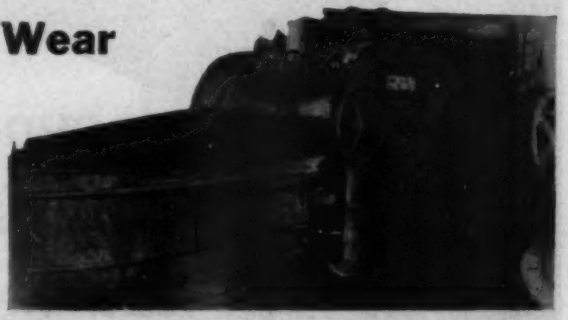

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Measuring Consistency *with* Stroboscopic Centrifuge

STEPHEN A. BUCKINGHAM

TRUE pulp consistency, exclusive of filler content, is a very important quantity in the beating process because, the setting of the engine and the time of treatment being equal, it governs the slowness obtained to a large extent. Hence, in order to obtain uniform beating or jordaning, it is important that the pulp consistency be controlled, not only in the beater but in the intermediate stuff chests as well. So far as the author knows, there is no existing stock regulator which works on the true pulp consistency alone. It should be of value, therefore, to have a method or instrument which will give a fairly accurate measure of the fiber consistency.

There are relatively simple methods of determining fiber consistency but they require drying, weighing and ashing, all of which take time. Since time is an important element and corrections of consistency errors must be made rapidly, an investigation was undertaken in the hope of finding a quick and reasonably accurate measuring device. The investigation resulted in the development of a stroboscopic centrifuge, the design of which was based on the following reasoning.

Basis for Method

If a suspension of fibers in water is allowed to stand without agitation for a considerable length of time, the fibers settle out. When equilibrium has been reached, the ratio of the depth of the fiber layer at the bottom of the mixture to the total original depth is a rough measure of the consistency of the whole suspension, before settling. This method of measuring consistency has nothing to recommend it except the fact that it requires no apparatus other than a beaker and a ruler. Besides being very uncertain and inaccurate, the procedure is very long.

The density of cellulose fibers is so near that of water and their size is so small that the viscous resistance of the water makes the settling rate slow. It also happens not infrequently that bubbles of air adhere to the fibers and effectively reduce their density so that no settling is visible after several days. It sometimes occurs in extreme cases that the settling is negative, or the fibers rise to the top of the suspension instead of falling to the bottom.

Much of the inaccuracy of the method results from the fact that the settled fibers rarely form a uniform compact layer with a sharply defined boundary, so that it is often very much a matter of guesswork to measure the depth of the fiber layer. Further inaccuracies arise from the unequal settling and packing coefficients of different lengths of fiber and from the fact that beaten fibers settle and pack quite differently from those which have not been beaten.

The settling of fibers in water is the result of the fact that the density of cellulose is greater than that of water. In general, the rate of settling of the particles of a suspension depends on the viscosity of the suspending fluid, the dimensions and concentration of the particles, and on the magnitude of the force which causes the settling.

The force ending to make a particle settle is its weight, diminished by the buoyant force of the suspending liquid, i.e.,

$$f = (d_1 - d_2)vg$$

where f = settling force
d_1 = density of fiber
d_2 = density of suspending fluid
v = volume of fiber or of displaced fluid
g = acceleration of gravity

Now d_1, d_2 and v are constants fundamental to the suspension, while g is not. Therefore, to increase the rate of settling, the value of g must be increased.

While the acceleration of gravity cannot be altered, the effect of a greatly increased gravity can be produced by the use of a centrifuge. If a suspension is placed in the cup of a centrifuge and the centrifuge set running, the settling force has two components, one vertical (which is the same as that given above), and one horizontal

$$f_h = (d_1 - d_2)va$$

where a = acceleration of the centrifuge cup.

If the rate of revolution of the centrifuge is high enough, the vertical force becomes negligible with respect to the horizontal force and may be forgotten.

The acceleration of the cup of a centrifuge is given by the equation

$$a = rw^2$$

where r = radius to the center of gravity of the cup
and $w = 6.2832S/60$
where S = rate of rotation of centrifuge in r.p.m.

A centrifuge having a radius of one foot and a speed of

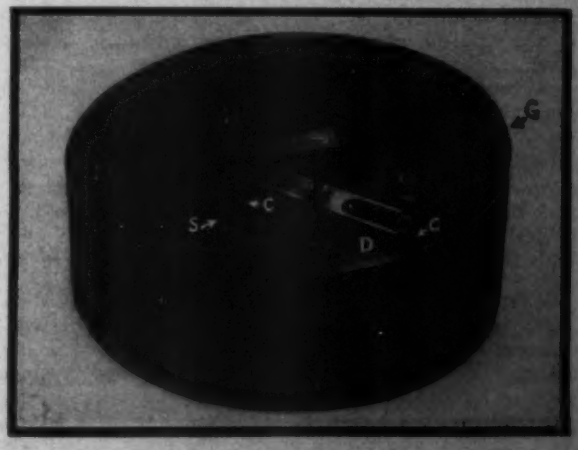


Figure 1.

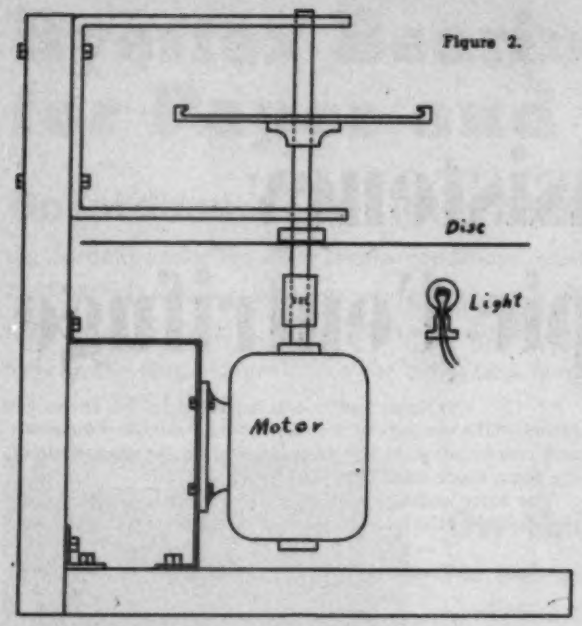


Figure 2.

1800 r.p.m. will have a cup acceleration of 35,532. Dividing by 32, the value of g,

$$a = 1110\,g$$

A machine having these characteristics is quite simple to build. It is a relatively easy matter to obtain accelerations at least a thousand times that of gravity and hence to increase the settling force at least a thousand fold over that of gravity alone.

The centrifuge, therefore, affords a means of minimizing the defects of the gravity sedimentation method since it permits the settling rate to be increased so much that the time element is no longer important. Air bubbles adhering to fibers have a negative settling force and remain attached to the fibers only because the adhesive force is greater than the algebraic difference of the settling forces of the fiber and the bubble, which tends to free the air from the fiber. In the centrifuge, the adhesive force remains constant, while both settling forces increase rapidly in absolute magnitude. Thus, in any practical case, the air is detached almost instantly and rises to the surface, while the fiber settles rapidly. The greatly increased settling force causes the formation of a uniform, compact layer, with a more sharply defined boundary so that the depth of the settled layer can be determined. The settling force becomes large compared with the stiffness of the fibers with the result that inaccuracies caused by variations in length of fiber and in amount of beating are minimized.

Although the ordinary centrifuge minimizes the faults of the settling method, it still has rather serious ones of its own. The main fault arises from the spring-back which results from the elasticity of the fibers and occurs when the settling force is removed by the stopping of the centrifuge. The spring-back loosens the packing, and makes the surface of the fiber layer less distinct and also somewhat indefinite in position unless sufficient time is allowed for the spring-back to become complete before a reading is made. The amount and rate of spring-back depend on the acceleration of the centrifuge while running, and on the type of fiber. There is the further difficulty that, because of the loosening effect of the spring-back on the fiber layer, the container must be handled with great care, when being removed from the centrifuge and measured. This care is required to prevent agitation, which tends to make the upper surface less definite and harder to measure.

The stroboscopic centrifuge, however, affords a means of eliminating the deleterious effects of spring-back and the need for careful handling of the suspension after centrifuging. Use of the stroboscopic principle enables the operator to observe the cup and its contents as if it were standing still although it is actually rotating at high speed. With the suspension apparently stationary, he can watch the settling of the fiber, observe when it stops, usually a matter of a minute or less, and then read the relative depths of the fiber layer and of the whole mixture. From the ratio of these two readings he can determine the consistency of the mixture in from 1 to 3 minutes without the need for drying or weighing.

The measurements made while the centrifuge is in operation furnish a zero level of the fiber layer from which the subsequent spring-back may be measured after the centrifuge is stationary. From the ratio of depth before and after spring-back, a fair estimate of the amount of beating may be made for any given furnish.

The Stroboscopic Centrifuge

Figure 1 is a photograph of the stroboscopic centrifuge, as developed, with cover removed to give a view of the inside. The ½ h.p., 1740 r.p.m. driving motor (Fig. 2) is located beneath the disc D and is connected to the shaft through a flexible coupling.

The cups C, C are of special construction and are shown schematically in Fig. 3. The essential peculiarity of the cups lies in their each having two slots cut through the wall at opposite ends of that diameter of the cup which is perpendicular to the trunnions on which it swings. Thus, when the cups are in the horizontal position assumed during revolution, it is possible, by looking vertically downward, to see right through them.

D is a large disc of bristol board, impregnated with shellac to increase the tensile strength, which is mounted so as to rotate with the shaft of the centrifuge. S is a slit cut radially in the disc D and so oriented that upon look-

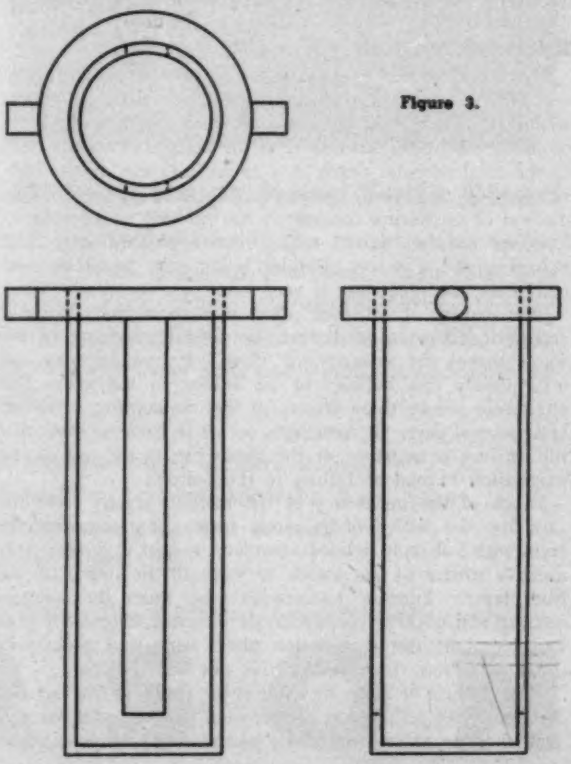


Figure 3.

ing vertically downward through the slits in one cup the three slits line up and an observer can see through all three.

A cover (not shown) having a slit radial to the shaft of the centrifuge is fitted over guard *G*.

It will be seen readily that as the centrifuge rotates, the four slits (in cover, cup and disc) line up vertically once each revolution. When they do line up, a light placed vertically beneath the cover slit will shine through all four slits and may be seen by an observer who looks into the cover slit. Hence, if there is a test tube containing a mixture of pulp and water in a cup, the dividing line between the settled layer of pulp and the clear water above is easily seen, as are the meniscus and the open end of the test tube.

If the slits are ¼ inch wide, the light will be visible for about 0.005 revolutions at a radius of 8 inches. Since the rate of revolution is about 30 r.p.s., it is visible for about 0.00016 second. The cup travels at about 1500 inches per second and hence moves only ¼ inch, or less, while it is visible. By using narrower slits it is possible to make the motion less. There is, however, no real point in doing so, and it has the fault of requiring a brighter light source.

The readings of the pulp level and the water level can be made in several ways. Probably the simplest method of reading is to use a graduated test tube. Another method is to mount a scale on the cover, parallel to the slit. A movable telescope with cross-hair or some other sighting device can then be moved until the cross-hair coincides successively with the meniscus and the pulp-water dividing line. The positions of the telescope for the two settings give the depths of pulp layer and of water and from the ratio of these depths the consistency is found.

Precautions should be taken in construction of the centrifuge to insure that the reading device shall have a definitely fixed position with respect to the shaft of the centrifuge. Any play between the two will introduce errors in the readings.

Method of Operation

To determine the consistency of a suspension, the procedure is as follows: Fill the test tube with unknown sample. Run the centrifuge until equilibrium is reached. Read the water and pulp levels. Divide the pulp level by the water level to find the depth ration and look up the consistency on a previously prepared calibration chart on which are plotted centrifuge readings against consistencies.

The procedure may be simplified by always filling the test tube to a predetermined level. Then only the depth of the pulp layer need be read and a calibration chart of pulp depth against consistency will give the consistency directly without the necessity of dividing to find the depth ratio.

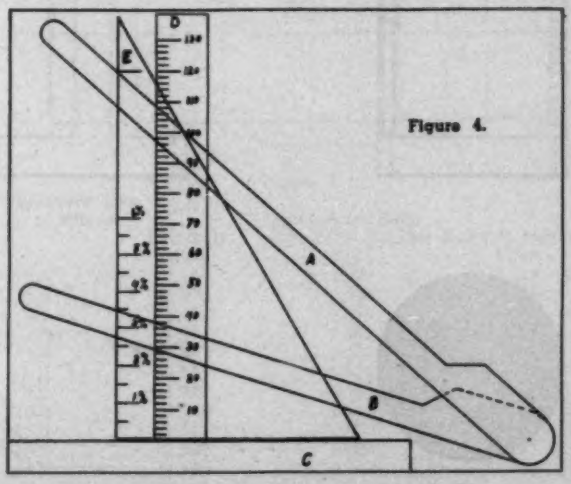


Figure 4.

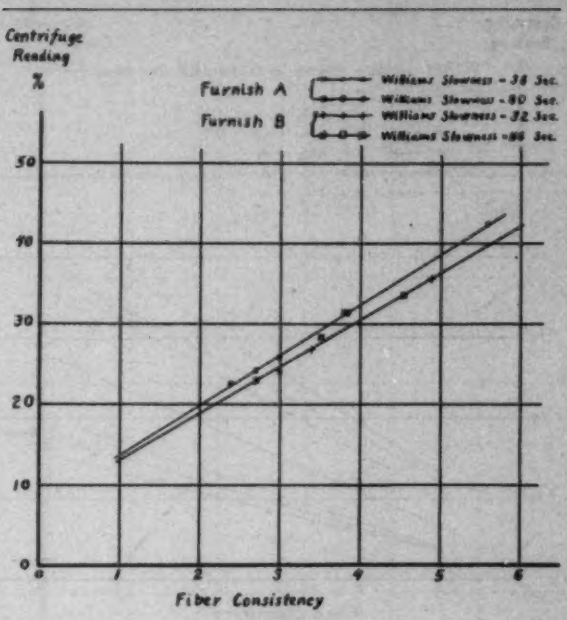


Figure 5.

Furnish A

Williams Slowness 38 Seconds		Williams Slowness 80 Seconds	
Centrifuge Reading	Fiber Consistency	Centrifuge Reading	Fiber Consistency
24.3	2.70	22.5	2.39
31.6	3.79	25.9	2.98
42.3	5.57	31.4	3.84

Furnish B

Williams Slowness 32 Seconds		Williams Slowness 116 Seconds	
Centrifuge Reading	Fiber Consistency	Centrifuge Reading	Fiber Consistency
24.3	2.99	23.1	2.76
26.9	3.39	28.5	3.50
35.7	4.88	33.7	4.53

Since it is often not convenient to fill the test tube exactly to a predetermined level and since the liberation of air adhering to the fibers often makes it useless to try, probably the most satisfactory simplification of procedure is to use a graphical calculator.

The Graphical Calculator

A graphical calculator which will make the conversion from telescope settings to consistencies can be made easily. Such a calculator is shown schematically in Fig. 4. The base of the instrument is a rectangular board. A straight-edge *C* is fastened along its lower edge; and two celluloid or other transparent straight-edges *A* and *B* are pivoted in one corner of the base and along the projection of the straight-edge. A strip of graduated paper *D* is fastened to the base so that its lines are respectively perpendicular and parallel to *C*. A second strip of graduated paper *E* is fastened with its lines parallel to two sides of a transparent draftsman's triangle in such fashion that the lines can be seen through the triangle. The graduated strip *D* should be marked in a manner proportional to the graduation of the scale on which the depths of pulp and water are read. The strip *E* should have an index mark corresponding to the level on *D* at which the calibration was made. This index corresponds to a depth ratio of unity or 100 per cent. The rest of the graduations on *E* should be the consistencies corresponding to the depth ratios found by calibration.

To use this calculator, set the upper edge of *"A"* to the graduation on scale *D* corresponding to the reading for the meniscus; set the upper edge of *B* on *D* to the pulp

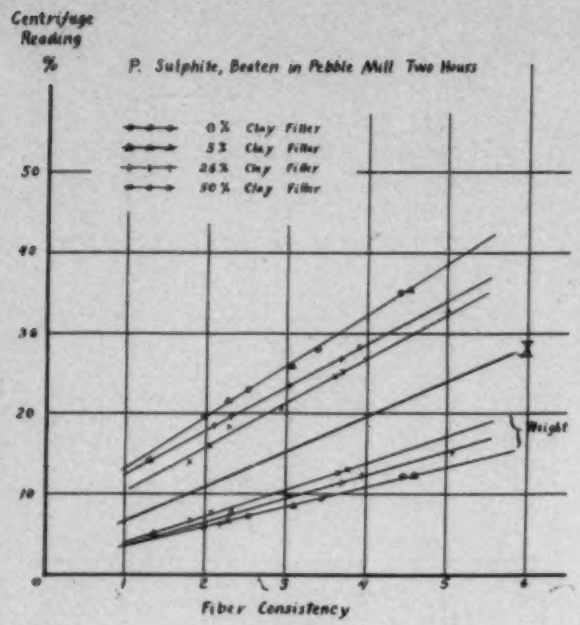


Figure 6.

% Clay Filler	Without Weight Centrifuge Reading	Without Weight Fiber Consistency	With Weight Centrifuge Reading	With Weight Fiber Consistency
0	19.6	1.98	5.8	2.00
	22.9	2.53	7.2	2.55
	27.9	3.39	9.4	3.45
	35.0	4.41	12.2	4.45
5	14.2	1.36	5.0	1.37
	21.3	2.27	6.6	2.29
	25.8	3.06	8.3	3.11
	35.3	4.53	12.3	4.60
26	18.3	2.11	6.0	2.19
	19.6	2.31	7.4	2.32
	23.4	3.03	9.7	3.06
	26.7	3.67	11.3	3.70
	28.3	3.90	12.2	3.95
	32.6	5.00	13.1	5.07
50	14.0	1.80	6.7	1.82
	16.0	2.05	7.6	2.07
	18.3	2.29	8.0	2.32
	20.6	2.93	10.2	2.99
	24.6	3.59	12.7	3.65
	25.1	3.69	13.2	3.76

depth reading; and then slide *E* to the right or left until the index mark falls over the upper edge of *A*. Under these conditions, the upper edge of *B* will indicate the consistency directly on *E*.

Results

Figure 5 shows calibrations made on two different furnishes the details of which are tabulated herewith. The upper curve, representing furnish (A), is marked with X's and circles. These points represent measurements on samples taken before and after jordaning. The two samples had Williams slowness values of 38 and 80 seconds respectively. The lower curve, representing furnish (B) is marked with crosses and squares which represent samples taken before and after jordaning and having Williams slowness values of 32 and 116 seconds respectively.

Examination of these two curves shows that, within the limits of the method, the degree of beating is immaterial. It is further seen that the individual points all lie within about 5 per cent of a smooth curve which happens to be a straight line. This precision is typical of the results to be expected of the method.

In the centrifuge used, the motor speed was not perfectly constant because of fluctuations in line voltage. As a result, the acceleration of the centrifuge cup was not a constant. It is probable that an appreciable part of the errors observed in these experiments arose from this cause. This source of error could be eliminated by the use of a synchronous motor. Further, it should be remarked that in the particular machine used in this work, there was some residual play between the scale on which readings were made and the shaft and that no correction for this play was possible. This fact doubtless accounts for some of the errors mentioned.

Pulps and Furnishes Used in Experiments

P.	Sulphite purchased outside and furnished in dry lap form.
P. R.	Sulphite purchased outside and furnished in dry lap form.
P. C. F.	Sulphite purchased outside and furnished in dry lap form.
Soda	made locally and furnished in slush form.
Furnish (A)	
900 lb.	*P.* sulphite
500 lb.	*P. C. F.* sulphite
150 lb.	soda
35 lb.	starch
34 lb.	alum
22 lb.	rosin size
2 gal.	silicate of soda
Furnish (B)	
400 lb.	*P.* sulphite
1000 lb.	soda
49 lb.	starch
41 lb.	alum
570 lb.	calcium carbonate filler

Effect of Filler

It will be noticed that the calibrations for furnishes (A) and (B) are different. This difference is the result of

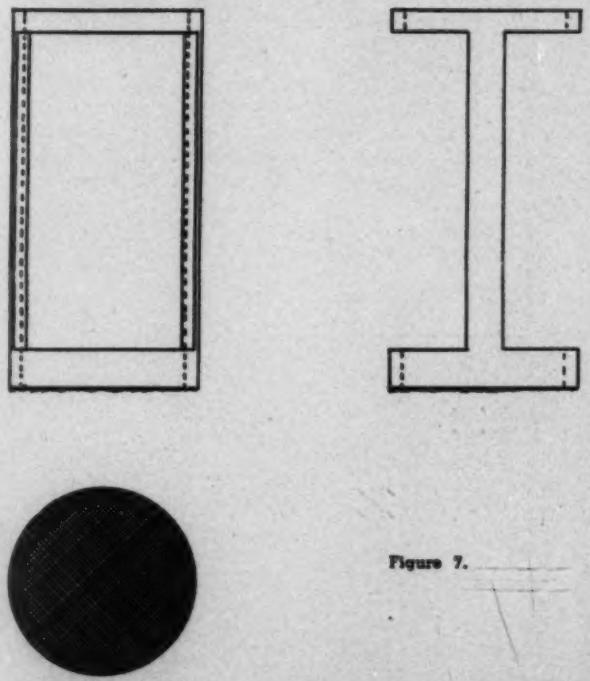


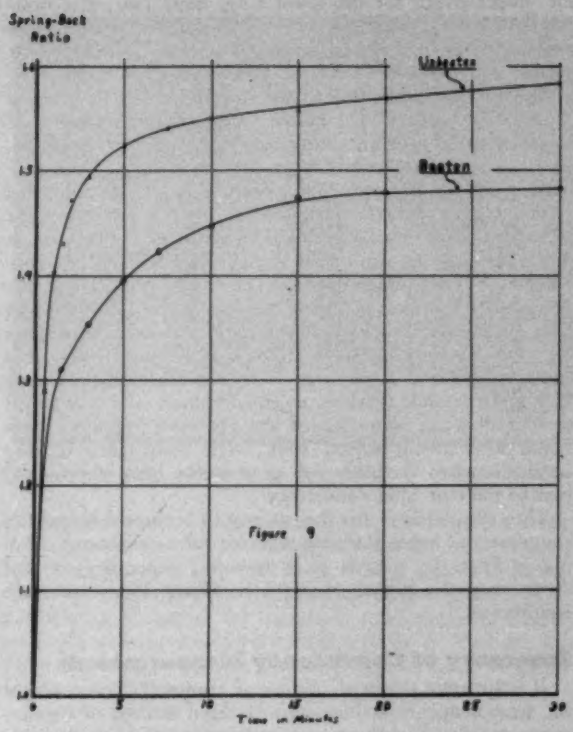
Figure 7.

the fact that furnish (B) has about 30 per cent filler while furnish (A) has none. The presence of large amounts of filler serves in effect to make the density of the fiber greater and hence to pack it slightly harder. The difference shown amounts to from 0 to 10 per cent over the range shown by the curves. This is a serious discrepancy, since the difference is sometimes greater than shown in Fig. 5.

A particularly exaggerated case is shown in Fig. 6. The furnish consisted merely of *P* sulphite beaten two hours in a standard pebble mill with various amounts of clay filler added as indicated by the legend. Two sets of curves are presented. The upper set of curves shows readings corresponding to filler contents of from 0 to 50 per cent clay. These readings were made in the same way as those of Fig. 5. The lower group of curves covers the same set of samples and the same ranges of filler but with the addition of one piece of auxiliary apparatus which is designated as the "weight."

The weight is shown in Fig. 7 and consists merely of two circular brass rings held rigidly apart by two separators. One ring is covered across the outer face by a piece of ordinary machine wire. Both rings are of the same diameter and of such a size that they slide easily inside the test tube. The spreaders and the second ring merely serve to keep the wire surface perpendicular to the axis of the tube.

In use, the ring is inserted in the top of the test tube on top of the suspension with the wire end down. When the centrifuge is set running, the weight settles very readily with the pulp, since the wire across the end allows it to pass freely through the water. Because of the relatively high density



Unbeaten		Beaten	
Recovery Time in Minutes	Spring-Back Ratio	Recovery Time in Minutes	Spring-Back Ratio
0	1.00	0	1.00
0.5	1.29	1.5	1.31
1.0	1.40	3.0	1.35
1.5	1.43	5.0	1.40
2.0	1.47	7.0	1.42
3.0	1.49	10.0	1.45
5.0	1.52	15.0	1.47
7.5	1.54	20.0	1.48
10.0	1.55	30.0	1.48
15.0	1.56		
20.0	1.57		
30.0	1.58		

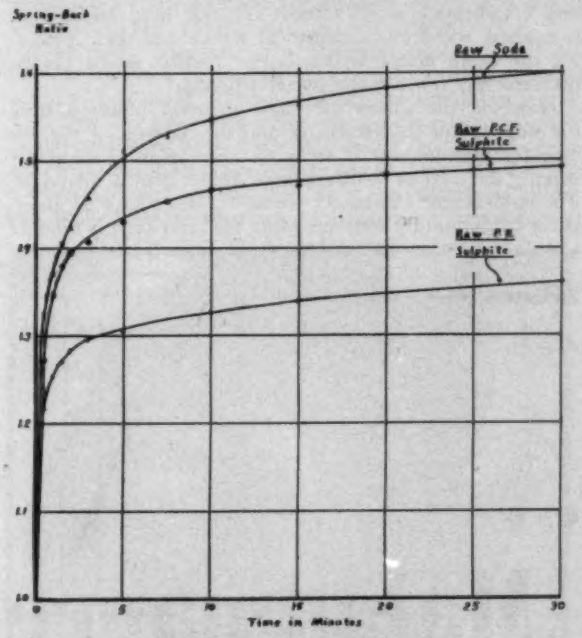


Figure 8.

Recovery Time in Minutes	Spring-back Ratio		
	Raw Soda	Raw P.C.F. Sulphite	Raw P.R. Sulphite
0	1.000	1.000	1.000
0.5	1.324	1.273	1.217
1.0	1.370	1.346	1.253
1.5	1.405	1.379	1.270
2.0	1.423	1.395	1.283
3.0	1.457	1.407	1.296
5.0	1.512	1.431	1.304
7.5	1.527	1.453	
10.0	1.546	1.467	1.326
15.0	1.564	1.472	1.339
20.0	1.582	1.484	1.347
30.0	1.600	1.492	1.360

of the brass, the weight has the effect of packing the pulp layer more tightly than when the weight is absent.

In Fig. 6, examination of the upper group of curves shows that, for a given true pulp consistency, the centrifuge reading goes down as the filler content goes up because the filler acts as a weight to increase the packing. On the other hand, the reverse is true in the lower group where the weight was used. When the weight was used, the packing was so close that the fiber layer became almost solid and the addition of filler actually increased the volume of sediment. Obviously, the particular weight used in Fig. 6 was too heavy and by choosing the magnitude of the weight properly, a condition of operation could be obtained in which the calibration would be independent of filler content. In this case, the scattered curves of the lower group would degenerate into a single curve, such as that marked "X".

The use of the weight has the further advantage of making the dividing line, which the observer sees, perfectly sharp; since he sees not the line between pulp and water but that between the top of the lower brass ring and the water. This fact necessitates a correction on the reading of pulp depth amounting to the thickness of the wire and lower ring. A correction is necessary on the reading of water depth also because the weight has a finite volume which produces an error in the water depth reading. By selecting

the proper depth for the lower ring, these two corrections can be made the same for ease in calculation. Further, the two corrections can be incorporated into the graphical calculator and hence need not be given further consideration.

The range of usefulness of the instrument lies from about 1 per cent to 6 per cent. Below 1 per cent, the settled layer becomes too thin to be measured with sufficient precision. Hence, to measure consistencies less than 1 per cent, one must make two or more runs. Starting with a sample of a given volume, the test tube is filled, centrifuged, the clear water poured off the top and refilled until all the fiber in the original sample is in the settled layer. Then the consistency can be computed from the initial volume of the sample and the final depth of the fiber layer. Above 6 per cent, the results become somewhat erratic because sometimes the fiber does not settle as much as it should. Thus, if a consistency above 6 per cent is to be measured, a sample of a given volume is taken, an equal volume of water added to it and a test tube full of the resultant mixture centrifuged after being stirred well. The consistency reading obtained, when doubled, will give a very close approximation to the true fiber consistency.

The time required for the settling to become substantially complete and hence the time required for a consistency reading is from ½ minute to 3 minutes, depending on the consistency, the higher consistencies taking longer to reach equilibrium.

Summary of Consistency Measurements

It is apparent that with the use of a suitably chosen weight the stroboscopic centrifuge offers a rapid method of measuring true pulp consistency over a wide range with a precision of 5 per cent or better.

Beating Versus Spring-back

It was remarked earlier that the spring-back which occurs when the centrifuge is stopped is a rough measure of the amount of beating to which the fibers have been subjected. As yet not enough data have been taken to justify any quantitative statement of just how exact a measure it is. However, enough experiments have been made to show that no quantitative rule for the relation between beating and spring-back can be formulated which will apply to all types of furnish.

Figure 8 shows the spring-back curves for three different unbeaten pulps. The abcissae indicate time in minutes after the turning off of the centrifuge. The ordinates are spring-back ratios or the ratios of the depth of the fiber layer at any given time to the depth while being centrifuged.

It is readily seen that the spring-back curves are quite different, indicating that a separate beating-spring-back calibration would be necessary for each type of furnish.

Figure 9 shows two curves taken on a standard all sulphite mill furnish before and after beating. From these curves it is seen that not only is the rate of spring-back radically different for beaten and unbeaten pulp but the ultimate amount of spring-back is also. It seems possible that with further development the spring-back method might prove valuable as a beating test, despite the need for multiple calibrations, which should not in themselves be insurmountable obstacles.

Other Uses for Stroboscopic Centrifuge

The stroboscopic centrifuge is not limited to the uses which have been mentioned. It can be used for all of the same purposes as an ordinary centrifuge by merely omitting the use of the stroboscopic attachment. It is especially useful in any process involving measurement of the amount of sedimentation from any suspension or fluid mixture. This is particularly true if one of the ingredients of a mixture diffuses appreciably into the other after centrifuging stops. It also is true if a sedimented material has very nearly the same density as the suspending fluid, or if its grain size is extremely small so that very slight agitation will cause it to go back into suspension.

An example is found in the grading of very fine grained pigments for size. One method of grading consists in letting a suspension stand without agitation until equilibrium is reached, sometimes a matter of weeks, and then measuring the depth of the settled layer. Similar results can be obtained in a few minutes by centrifuging.

However, the almost inevitable agitation resulting from the stoppage of the centrifuge and the removal of the test tube for measurement is likely to cause spurious results by making the layer of sediment seem deeper than it should be. The stroboscopic attachment eliminates this source of uncertainty by permitting readings while the centrifuge is running and the maximum settling force is in operation.

Acknowledgment

The author wishes to express his thanks to the S. D. Warren Co. for permission to publish these results.

Hard-Facing . . . Reduces Maintenance

R. K. KENNEDY

TO KEEP manufacturing equipment in first-class condition at all times is a real problem. Abrasive wear of even ostensibly unimportant parts can put any machine, large or small, out of service. Reduction of wear, and the resulting increase in productivity of manufacturing machinery, coupled with a smooth, uninterrupted flow of work, are the aims of every maintenance engineer. A very efficient and economical method of accomplishing this is the welding process known as hard-facing.

Hard-facing is the covering or coating of a metallic surface with a welded-on layer of an alloy specifically designed for wear-resistance. The alloy is applied only to surfaces to be exposed to wear. Thus, a part may be fabricated of a base metal selected for its strength and toughness, without regard to wearing properties, and its wearing surfaces protected by an alloy which can withstand wear to a much greater degree. Surfaced in this way, machine parts last many times longer, correspondingly decreasing replacement costs, shutdowns and losses due to idle labor during replacement periods. Parts which have been scrapped due to ex-

cessive wear can be reclaimed and made even more effective than they were originally. Hard-facing often saves power, too, especially in cases where a sharp cutting edge must be retained. Finally, wearing parts may be made less expensively.

An example of how hard-faced parts can reduce expenses is shown by the experience of a large paper mill in the west. The practice here had been to use high grade steel inlays in each of the four edges of the chipper anvils (Fig. 1). Two or three times each week an edge wore out, necessitating a shutdown for turning the anvil. By replacing these anvils with others of machine steel hard-faced on each edge, the life of each anvil was increased to four months. The increase in original cost amounted to less than 12 per cent, but the life of each piece was prolonged by 800 per cent.

Two hundred dollars per set was the price paid for shredder knives (Fig. 2) by an Ohio mill. One set of these knives lasted but a month. Here was real opportunity for

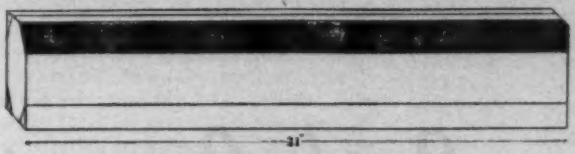


Fig. 1—Sketch showing method of hard-facing four edges of chipper anvil.

savings. A set of worn knives, rescued from the scrap pile, was hard-faced at a cost of $90.00. The hard-faced knives lasted six months and, when worn, could be rebuilt repeatedly. The yearly cost for shredder knives at this mill was, in this way, reduced from $2,400 to $180.

Tests were conducted at a Maryland paper mill to determine the value of hard-facing a liner in a chipper sprout, called a "half moon" (Fig. 3). Where the life of the former steel liner had been three weeks, six months' wear was given by the hard-faced liner. New half moons cost $63.00 apiece delivered, and it was expensive to install them. Hard-facing a worn liner cost but $20.00. Again an appreciable saving had been made by investigating hard-facing opportunities.

Fig. 2—Cost of shredder knives reduced by hard-facing.

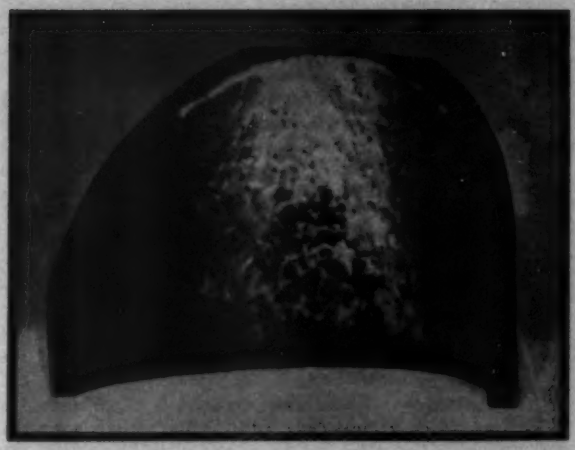


Fig. 3—Hard-faced half-moon at the end of six months' service.

Hog bed plates which had to be replaced twice a week, lasted five months after hard-facing. Throat plates for shippers have been found to last eight times as long after hard-facing.

A small but economical application of this process is the hard-facing of latches for automatic stake pockets. This is an application in which very little expense is involved, but these small but important parts are kept in ideal condition for easy operation.

A recent use of hard-facing, which has gained much interest on the part of maintenance engineers, is for the protection of steam valves. The wear resistant hard-facing alloy, applied to steam valve seating surfaces, lasts from 6 to 10 times longer than usual materials. Elimination of wire-drawing, erosion and corrosion are the essential advantages gained by hard-facing steam valves for high temperatures and pressures. At one plant, using a boiler pressure of 1,200 lb. per sq. in., the life of valves on the duplex boiler feed pumps was increased ten times by the use of hard-faced valves. Records of the life of ordinary valves showed that replacement was necessary after 500 hours of operation due to deep grooving on the seats. Hard-faced valves operated for well over 5,000 hours before it became necessary to rebuild them. Valves with hard-facing material applied to the seating surfaces can now be obtained from any of the large valve manufacturers.

A New York paper company found that by hard-surfacing the ends of paper roll bars where the collar set screws had worn grooves, the life of the bars could be increased from 1½ to 10 years. Hammers, of swing hammer crushers, a standard hard-facing application in many plants, last from 4 to 6 times longer. A four-way drill used on an air-driven tube cleaner cleaned only one tube thoroughly; the same drill when hard-faced cleaned twenty tubes. And so the list goes on.

There are a number of hard-facing metals developed for the purpose of resisting abrasion, possessing reasonable strength, and yet easily welded to the base metal. For convenience these alloys may be divided into four classifications.

Alloy steels comprise the first class. The alloying elements here are chromium, tungsten, manganese, silicon, etc., but usually the total of alloying constituents is less than 20 per cent. These steels are tougher and less expensive than the harder hard-facing materials, one of their main uses being as a filler in the rebuilding of badly worn parts preparatory to the application of a final hard surface of a more wear-resistant material. Some of these alloys, such as Hascrome, work-harden under impact.

The second class of alloys contains from 50 to 80 per cent of iron alloyed with one or more elements, such as

tungsten, chromium, carbon, silicon, manganese, and sometimes small amounts of cobalt and nickel. These alloys are used wherever toughness and moderate degree of wear resistance are required.

The third class of wear-resisting alloys consists of the non-ferrous alloys of cobalt, chromium, and tungsten, known as Haynes Stellite. These alloys have the unusual advantage of employing cobalt as a base metal, resulting in a high degree of red hardness. This alloy was employed as the hard-facing material in most of the examples herein described.

Diamond substitutes constitute the fourth class of hard-facing materials. Tungsten carbide particles held in a steel binder are a typical example. Since the carbide is not melted by ordinary welding methods, it is usually finely crushed and held in place by the fusion of the binding material to the base metal. This class, however, finds but limited use in the paper industry.

Application of a hard-facing material is made either by the oxy-acetylene or, less frequently, by the electric arc welding process. The alloy in the form of welding rod, can easily be applied by an experienced operator. Preference between the use of oxy-acetylene welding and electric arc welding depends upon the conditions of the particular job. If the job is not too large, and if the facing must be ground to size before use, the oxy-acetylene blowpipe is preferable. However, on large jobs, and where a rough surface or surface cracks are not objectionable, the electric arc may be utilized.

In these days of keen competition, a slight economy in production makes for much more successful and efficient operation. One of the easiest ways of effecting economies is by definitely listing the machine parts which are continually wearing out, hard-facing them and keeping an accurate check on their maintenance costs both before and after hard-facing. Many of these parts may be made to last from 6 to 10 times longer, often at a considerable saving in renewal cost. By following this plan, expenditures for replacements of wearing parts can be reduced to a minimum and, in addition, operating efficiency improved through the elimination of frequent shutdowns for replacement.

Permanence for Book Papers

JESSIE E. MINOR

IN the *Journal of Research* of the National Bureau of Standards, volume 17, pages 859-869, December, 1936, is a report of a research on the permanence of book papers which is of special interest to paper manufacturers and buyers. The article discusses relative permanence of book papers made from rag fibers and from wood fibers and includes some very complete data of tests made on material and finished paper.

It is possible for the Bureau, with its semi-commercial paper machine and splendid research equipment to make parallel lots of paper in which every condition is standardized and to conduct runs under as nearly parallel conditions as is humanly possible. Thus, differences found in the results of chemical and physical tests may be traced directly to differences in inherent properties of the raw materials used.

In reviewing the article, it seemed to the author that the interpretative portion could be supplemented very profitably.

The article states, in part, that the materials used for the study were obtained from commercial manufacturers and that they consisted of four wood pulps produced with special pulping and bleaching treatments to obtain high purity and strength; soda pulp and sulphite pulp of the ordinary book paper grade; new rags of the grade commonly known as number one white shirt cuttings, and two grades of old rags, number one old whites and twos and blues.

Chemical constants of the pulps and half stocks were tabulated in the presentation as were the physical and chemical constants of the finished papers, and the effect of the standard heat treatment of 72 hours at 100 deg. C. upon these constants.

Fiber Materials of Furnishes

Alpha content is defined as the percentage of pure paper-making material of fiber length and strength above a certain empirical minimum present in a pulp or half stock. Hard rag stock such as is used in bond papers may have an alpha content of from 97 to 99 per cent, but softer rags with an alpha content of 90 to 93 per cent are preferred for printing book papers.

The alpha content of the rag half stocks covered by the report ranged from 93.0 for new shirt cuts to 90.5 for twos and blues or the colored, worn rags, while that of the four alpha pulps ranged from 90.6 to 84.1, and that of the ordinary sulphite pulp was 82.0 per cent.

Apparently, the best alpha pulp available for book papers has an alpha content approximately equal to or less than that of the half stock from colored, worn rags, and the lower grades of alpha pulps have alpha contents much nearer to that of sulphite pulp than to that of the better alpha pulps.

In the non-alpha portion, the Bureau distinguished two types of material—the beta portion of pure cellulose in fragments too small to add strength to the paper but excellent for filler, and the remaining or gamma portion which includes all non-cellulose impurities from the raw material or from process degradation.

Rag stocks average 30 per cent higher in beta content than do the alpha wood pulps with the sulphite in the same range as the alpha woods. In any consideration of purity of fiber separate from strength, the beta should be added to the alpha content. This addition would give 99.17 per

Chemical Tests on Fibrous Materials*

Fiber	Alpha Content %	Beta Content %	Gamma Content %	Pento-sans %	Copper Number	Ash %	Resin Content %
Alpha 1	90.6	4.8	4.6	3.8	0.72	0.11	0.24
Alpha 2	87.8	6.7	5.5	6.0	0.86	0.19	0.26
Alpha 3	88.0	6.2	5.8	5.6	0.69	0.10	0.13
Alpha 4	84.1	4.7	11.2	10.3	0.72	0.16	0.13
Sulphite	82.0	5.4	12.6	6.2	3.34	0.26	0.70
Soda	78.2	18.6	3.2	21.3	3.83	0.42	0.20
No. 1 New Wht. Rags Bleached H. S.	93.0	6.4	0.6	0.8	0.38	0.12	
No. 1 Old Wht. Rags. Bleached H. S.	90.3	8.9	0.8	0.5	0.41	0.16	
Twos and Blues. Bleached H. S.	90.5	8.4	1.1	0.5	0.49	0.22	

*From tabular material in report—*Journal of Research*, National Bureau of Standards, Vol. 17, pages 859-869, December, 1936.

cent of papermaking material for the rag stocks, 93.23 per cent for alpha pulps, and 89.4 per cent for the sulphite pulp.

In gamma content, or the actually degraded or foreign material, the rag stocks ranged from 0.6 to 1.1 per cent, while the alpha pulps ranged from 4.6 to 11.2 per cent. In other words, the alpha pulps averaged 8 to 10 times as much degraded and foreign material as did the rag stocks.

The test for pentosans, another form of non-cellulose material, gives for alpha pulps an average similar to sulphite pulp and about 10 times that for the rag stocks.

The copper number represents the amount of material in a sample which will be oxidized by a copper solution, thus indicating for these stocks the relative amounts of degraded fibrous material present. Since that material is easily dissolved out of rag stocks and the alpha pulps (both of which have been through an alkaline treatment) by alkalies, the copper number values are low; while the acid treated sulphite pulp shows a relatively high number.

Chemical Data on the Book Papers

Furnish	Ash %	Resin %	Acid Kappa %	pH	Alpha %	Beta %	Gamma %	Pentosans %	Copper Number	HEAT TREATED Alpha %	Beta %	Gamma %	Pentosans %	Copper Number
Alpha 1	10.8	0.22	0.006	6.5	90.2	3.2	6.6	3.9	0.70	−0.2	+0.2	0.0	0.0	+0.15
Alpha 1	11.5	0.22	0.006	6.5	90.9	2.7	6.4	4.2	0.71	−0.7	+2.4	−1.7	−0.2	0.13
Alpha 2	10.7	0.24	0.011	6.4	85.7	6.7	7.6	6.3	0.88	−0.2	+0.2	0.0	−0.1	0.29
Alpha 2	11.4	0.26	0.010	6.8	85.2	6.2	8.6	5.6	0.90	−1.0	+2.0	−1.0	0.0	0.17
Alpha 1 (75%) Alpha 2 (25%)	11.0	0.20	0.001	7.3	89.6	4.6	5.8	3.7	0.77	−0.4	+0.4	0.0	+0.1	0.17
Alpha 3	11.9	0.13	0.010	6.6	85.1	8.7	6.2	5.6	0.81	0.0	+0.3	−0.3	−0.1	0.15
Alpha 4	12.2	0.13	0.010	6.7	82.6	2.4	15.0	10.6	0.85	−0.4	+0.2	+0.2	+0.1	0.10
Alpha 4	12.4	0.13	0.008	6.7	82.4	3.0	14.6	10.7	0.87	−1.0	+0.5	+0.5	+0.1	0.10
Sulphite (50%) Soda (50%)	5.3	0.40	0.017	6.2	77.8	14.5	7.7	13.9	2.75	−0.4	−1.0	+1.4	+0.1	0.31
Sulphite (50%) Soda (50%)	5.7	0.50	0.021	6.1	77.7	15.1	7.2	14.2	3.02	−1.0	+1.2	+0.2	−0.7	0.27
New Rags	11.6	0.24	0.004	7.0	95.2	4.2	0.6	0.6	0.33	+0.2	−0.6	+0.4	0.0	0.03
New Rags	11.6	0.22	0.010	6.8	95.0	4.2	0.8	0.8	0.35	−0.2	+0.2	0.0	−0.1	0.04
Old Rags	12.7	0.29	0.001	7.3	92.6	6.7	0.7	0.7	0.43	−0.6	+0.3	+0.3	0.0	0.05
Old Rags	12.5	0.36	0.002	7.3	92.8	6.5	0.7	0.8	0.39	−1.0	+0.9	+0.1	−0.1	0.10

While high copper value is suspicious, it is of little significance in itself unless the cause of its development is still functioning. All other things being equal, a sulphite pulp in which the acid residues had not been well washed out undoubtedly would show a much lower permanence than would an alpha pulp of alkaline treatment. Tests made on the finished paper from the sulphite pulp in question indicate a fairly good washing, so the copper number was not increased by oven aging though the folding endurance dropped by nearly 60 per cent. While the rag stock had a copper number of about 60 per cent that of the alpha pulp, the point is not necessarily significant for permanence unless evidence is found that the original cause of copper number in either case is continuing to function in the finished paper.

This data from chemical testing of materials of furnish, therefore, brings out very convincingly that the gap in chemical purity between alpha pulp and rag stock is very much larger than it is between alpha pulp and the ordinary sulphite pulp, such as has been proven in use to be of low permanence quality.

Folding Endurance and Tearing Strength Data on the Book Papers*

Furnish	Fold Machine (Double)	Fold Cross (Double)	Tear Machine g.	Tear Cross g.	Fold Retained % Oven	Tear Retained % Oven
Alpha 1	78	34	70	72	95	100
Alpha 1	74	32	66	70	100	103
Alpha 2	2200	730	128	136	69	86
Alpha 2	3300	2000	104	128	80	95
Alpha 1 (75%) Alpha 2 (25%)	180	70	84	92	101	95
Alpha 3	1760	1140	109	96	83	95
Alpha 4	2400	2190	95	110	87	104
Alpha 4	1830	3820	93	102	83	102
Sulphite (50%) Soda (50%)	85	44	54	60	57	95
Sulphite (50%) Soda (50%)	66	34	53	59	55	94
No. 1 New wht. rags	63	51	98	88	130	97
No. 1 New wht. rags	143	65	95	91	105	104
Old rags[1]	21	10	63	71	95	95
Old rags	11	8	66	66	109	98

*From tabular material in report—*Journal of Research*, National Bureau of Standards, Vol. 17, pages 859-869, December, 1936.

[1]Furnishes of old rags consisted of 50 per cent old whites and 50 per cent twos and blues.

Finished Papers

The papers made from the rag stocks, whether worn rags or new rags, showed an increase of alpha content of about 2 per cent over that of the half stock used, probably due to the loss of some of the weaker material in the back water. For the strong rag stocks used in bond papers, such loss would be less and the proportionate increase in alpha content for finished paper should be more than in this case.

Under the same conditions of manufacture, one of the alpha papers showed the same alpha content as did the pulp, while the papers from the other three alpha pulps showed a loss of alpha content of from 2 to 3 per cent and of the same order as in the furnish of ordinary sulphite, and soda pulp which gave a paper of 2.3 per cent less alpha content than the pulp used. This point would seem to be a very definite contribution to the literature which has not previously been emphasized.

Rag manufacturers have found repeatedly that the alpha test is of little value for rag stock since it does not indicate that the greater portion of good rag stock is considerably above the division line marking the alpha portion. For alpha pulps, the proportion dangerously nearer the dividing line is much greater. Therefore, slight degradation would show up more quickly on alpha pulp than on rag stock.

Even weak rag fibers chosen for softness rather than for strength were able to resist the beater treatment so that the finished paper showed that the loss in the back water more than offset any degradation from alpha content. In the case of the lesser resistant alpha pulps, the reverse is true and the finished paper showed a definite decrease of alpha content. A partly offsetting argument is that the wood pulps beat to slowness more easily than do the rag stocks, and, if run on the machine less free, would retain more of the degraded material than would the freer running rag stock.

The copper number of the alpha pulps averaged an increase of 9 per cent in the finished paper, while that of the rag stocks showed a decrease of 14 per cent.

The furnish of sulphite and soda pulps, with its high original copper number, showed a loss of copper number forming material of almost 24 per cent, evidence that its

pH and Some Physical Tests of Finished Papers*

Furnish	pH of Furnish	Weight lb.	Tensile Machine kg.	Tensile Cross kg.	Stretch Machine %	Stretch Cross %	Thickness in.	Opacity— %	Mullen
Alpha 1	6.7	56.3	3.8	2.5	1.2	4.4	0.0036	90	21
Alpha 1	6.7	56.0	4.4	2.9	2.0	5.9	.0035	90	22
Alpha 2	6.7	54.2	6.8	4.0	2.7	6.3	.0034	88	33
Alpha 2	6.8	56.3	8.8	4.5	2.6	7.9	.0033	89	40
Alpha 1 (75%) Alpha 2 (25%)	6.6	56.5	5.3	3.1	2.1	5.9	.0037	89	24
Alpha 3	6.5	57.5	7.1	4.4	2.5	8.0	.0036	87	33
Alpha 4	6.9	53.9	8.4	5.7	2.3	7.6	.0033	82	34
Alpha 4	6.2	55.4	8.0	5.9	2.5	8.2	.0034	82	37
Sulphite (50%) Soda (5%)	6.7	56.1	5.9	3.8	1.9	5.5	.0040	87	22
Sulphite (50%) Soda (50%)	6.7	54.9	5.5	3.4	1.5	3.5	.0039	87	22
No. 1 New white rags	6.8	56.0	4.6	3.1	2.5	5.0	.0036	90	17
No. 1 New white rags	6.9	54.1	4.8	3.0	2.0	4.5	.0035	90	18
Old rags	6.7	55.8	3.7	2.4	2.0	4.0	.0040	92	15
Old rags	6.5	55.9	3.1	2.2	2.0	3.0	.0040	93	13

*From tabular material in report—*Journal of Research*, National Bureau of Standards, Vol. 17, pages 859-865, December, 1936.

degraded material from pulp manufacture had not been removed as thoroughly as had that of the alpha pulps.

It is well known that the pH of head box is not a direct criterion of probable pH of the hot water extract of finished paper, but in this case, where type of water and treatment are alike in all runs, the relative differences between pH of head box and finished paper are significant.

The average pH for the rag papers increased from 6.7 at the head box to 7.3 for the paper; that for alpha pulp remained unchanged at 6.6; while that for the sulphite-soda furnish fell from 6.7 to 6.15.

Apparently the alkalinity of the interior of the rag fibers is paralleled by about neutrality for alpha pulps and direct acidity for sulphite pulp. This difference is significant in interpreting effects of oven aging upon copper number as the increase of copper number from oven aging appears to be in the same order as the change of acidity or pH.

This evidence of the relative effects of the manufacturing process upon rag stock and alpha pulps would seem to be of prime importance in the choice of furnish for durability. Resistance to the mechanical process of beating should parallel the wear stresses of paper uses.

The question also arises as to what would be the effect on a similar set of data of parallel runs made at pH values of 5.0 or below, such as are more common commercially than the 6.1 to 7.3 values of these papers. Would the slight acidity of such beating liquid make even wider this disparity? Would the presence of rosin size, which in quantities is known to be detrimental but which was omitted from these experimental runs, affect this ratio? It could be expected normally, that a paper which is more susceptible to mechanical degradation, due to its more porous fiber structure and greater surface exposure also would be more susceptible to slight acid degradation and, therefore, less permanent.

Paper Permanence

In the evaluation of the permanence quality of book papers, it is not so much the strength of the new paper which is of importance, but the rate at which the paper may be expected to maintain its strength, flexibility and color above the minimum of use requirement. For this purpose, the Bureau advocates the evidence from their standard oven treatment of 100 deg. C for 72 hours as of the most significance.

After studying the data, it is difficult to understand the statement of the Bureau that "The alpha cellulose content . . . has been found to be closely related to the stability of the paper." The changes it found in alpha content under this heat treatment are small and, for the three types of paper being considered, they are so nearly alike that one must conclude either that the three types of paper are equally permanent or, which seems more likely, oven aging is only affected by internal impurities, eliminating external effects of impure air and light, which, in this instance of equal purity of processing, did not markedly influence the alpha content though it did show up on the copper number and folding endurance.

The high increase of beta content for alpha pulps without a parallel loss of alpha content is difficult to understand unless oven heat caused a chemical change in materials which vitiated the test method.

Changes of copper number values due to oven treatment are more interesting in that they show differences for the three types of fibers used which are of the same order as those shown for the effect of the beating process upon the raw material. In the oven, the copper number for the rag papers increased from 0.03 to 0.10; for the alpha papers, from 0.10 to 0.29; and for the sulphite-soda furnish, from 0.29 to 0.31. This three fold increase of copper number from oven aging for alpha pulp paper versus rag paper, when considered parallel to the definite increase during the beating process is unique evidence that in chemical or physical resistance to degradation, the alpha pulp is not equal to the lower grades of rags either in durability against the process of manufacture or in permanence against the degradation of normal storage conditions.

Physical tests on book papers, as stated by the Bureau, are of little significance except in the interpretation of the results of aging treatment. Book papers are sold largely for printing quality and for permanence and on these qualities the data gives interesting information. The rag papers are slightly superior in stretch, noticeably in the cross direction; and, in opacity, they gave a contrast ratio of 91.25 against 87.13 for the alpha papers.

In folding endurance, as in alpha content, the permanence indication for rag papers is decidedly superior to that for alpha pulp papers. A fold retention for rag papers after aging, was from 95 to 130 per cent of the original; while the alpha pulps retained from 69 to 100 per cent of the original fold, and the soda-sulphite furnish from 55 to 57 per cent.

These figures again are in the same order as those of pH of interior of fiber and copper number increase on oven aging. In other words, the high alkalinity of interior of rag fibers and the fiber structure seem to give a protection against oven aging as indicated by changes of folding endurance and of copper number; the neutrality of the alpha pulps gave a partial protection in the same direction while the acidity of the sulphite fibers caused a direct oven loss of folding endurance and increase of copper number.

Tearing resistance does not bear any close relation to permanence properties, so it is not surprising to find that losses of tear from oven treatment for the rag and alpha papers of this study are in the same range.

Summary

Data, therefore, developed in the laboratory and machine room of the National Bureau of Standards, has brought out the following points of interest to paper manufacturers and buyers:

Beater Furnish Material:

Rag stocks averaged 4 per cent higher in alpha content, or in the percentage of strong, long, papermaking fibers, than did the alpha pulps; and only one of the four alpha pulps was even equal to twos and blues.

Alpha pulps contained from 8 to 10 times as much indigenous impurities of the fibers, gamma content and pentosans, as did the rag stocks.

The alpha wood content is nearly twice that of the rag stock in copper number, or the chemically degraded fibrous material.

Effect of Beating and Papermaking Process:

The rag papers averaged 8 per cent higher than did the alpha pulp papers in alpha content, indicating that, in processing, the rag stocks will gain alpha content through dissolving of degraded material while alpha pulps lose through breaking down of good material.

The rag stock averaged a loss in copper number while the alpha pulp showed a gain, leaving a difference of 25 per cent greater than for the materials used.

The rag papers showed more alkaline pH values than did the beater liquids; the alpha pulps maintained the same value, and the sulphite furnish showed more acid.

Effect of Oven Aging or Permanence Testing:

Changes in alpha content for rag and alpha papers were so small and so nearly of the same order as to indicate that the test is not significant for permanence.

Increase in copper number for the papers from alpha pulp is about three times that for the rag papers.

Rag papers retained 110 per cent of the original fold while the alpha papers averaged 97.5 per cent retention.

Change in tearing resistance is of the same order for both types of papers but it is accepted that tear is not a factor of permanence.

New Development in
Stock Chest Agitation

E. M. UNDERWOOD, Vice President
The Patterson Foundry & Machine Co.

AGITATION of paper stock has always been one of the annoying problems of the paper industry, and many devices have been used with varying degrees of success.

In vertical tanks, operating on low consistences, paddles, propellers, turbines and other types of apparatus have been tried, and, in the higher consistencies, these various types of stirrers, as well as screw flights, have been used in draft tubes. Paddle type stirrers have always left much to be desired, because they operate at slow speeds, and therefore provide actual mixing effect only on the material nearest the paddles. Propellers, placed either through the side walls or on vertical shafts, reduce the mixing time somewhat, but usually at the expense of greatly increased power consumption, the actual reduction in mixing time being disproportionate to the increased cost of power consumed. Turbines in this class of service have many of the characteristics of propellers and present the same difficulties when applied to the agitation of paper stock.

Horizontal machine chests with half round bottoms have in most cases been agitated by paddle arms of various shapes or similar arrangements on horizontal shafts running through the center of the chest. In a few instances in the last few years, horizontal propeller type agitators have been tried. Most plant operators who have used propeller type stirrers are familiar with the drawbacks and know that this type of stirrer simply "gives the material a ride" without actually mixing it, except possibly for that portion immediately adjacent to the propeller blades.

The limitations of the aforementioned conventional type of mixing apparatus are generally recognized in the paper industry, and much time and effort has been expended to develop an improved type of mixer. Engineers, chemists, plant operators and machinery manufacturers have for years experimented with various types of apparatus in an effort to secure improved performance, and it now appears that a desirable improvement has been discovered for stock consistencies up to approximately 6 per cent.

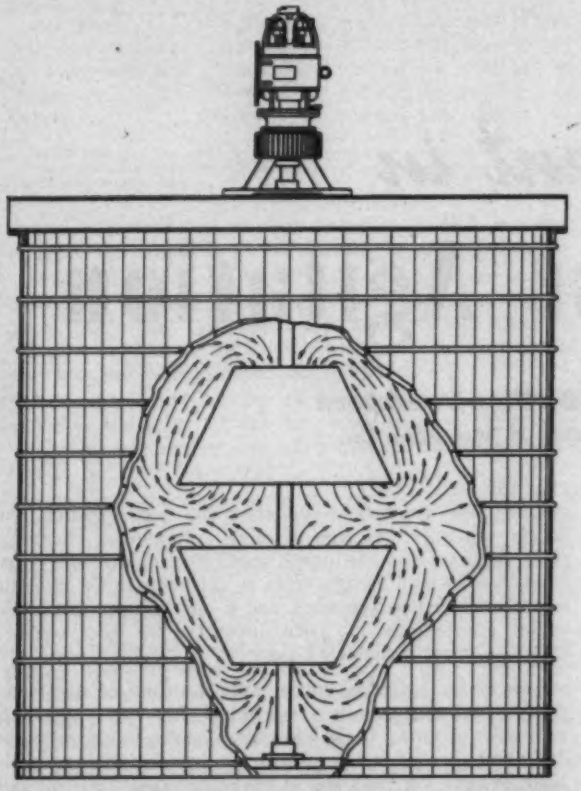
This newly developed mixer takes the form of two truncated cones arranged in a vertical position and opposing each other as shown in the illustration on the following page. This new type of stirrer provides a type of mixing action radically different from any of the other known devices, and when used in a tank 10 feet in diameter by 10 feet deep on 6½ per cent stock, it caused, when color was added to the stock, a complete distribution to all parts of the batch in 50 seconds, and a completely uniform coloring in 3 minutes. The same effect, when using propeller or turbine stirrers with similar power input, may require as much as one hour.

It may be interesting to follow the path of pulp in a vertical chest equipped with this new agitator and note the forces and shearing effects that occur in the various parts of the circuit. As the cone revolves, a radial or centrifugal force is produced which increases with the cone diameter. This force has a vertical component at the sloping surface of the cone which causes a circulation from the small to the large end of the cone. At the large opening, the pulp is thrown tangentially from the cone toward the chest walls. After discharge from the agitator, it moves vertically to reenter the cone at the smaller end.

The shearing effect that is apparent to the observer occurs at the top of the tank. Liquid stain poured on top of the pulp, near the wall of the chest, in such a manner as to form a round spot of color, is drawn out by shearing forces to form an elongated streak before the color disappears down a central vortex and into the cone. This streak of dye is neither radial nor a circle arc, but a combination of the two. The form is more nearly that of a spiral involute. This is the first mixing effect in the horizontal plane.

As the pulp enters the cone, it must be accelerated. Shear occurs as the pulp enters the cone for the agitator velocity is many times greater than the angular velocity of pulp outside of the cone. This is the second mixing effect in the horizontal plane.

After the pulp enters the agitating cone, vertical shear occurs. This cannot be observed, but its effect is easily seen in a specially constructed experimental chest. This chest had several sight glasses near the tank walls for noting dye distribution. Dye dumped instantly into the small end of the



cone was not discharged en-mass but was well distributed through a considerable volume of pulp. This would be expected if one recalls that the vertical forces vary from top to bottom of the cone, and increase progressively with the increase of cone diameter.

After discharge from the cone, the tangential striæ of pulp from the upper and lower cones flow in apparently parallel streams. However, in the experimental tank, it was observed that when the pulp had made one complete circuit around the upper cone, after adding dye, the pulp at the top and bottom of the chest appeared to be equally colored. This indicates that the interchange of pulp between top and bottom agitators is far greater than would be expected. Of course, the difference can be increased by using cones of different diameters for the top and bottom agitators.

The pulp in moving from discharge to entrance of the cone again undergoes shear in the vertical plane. This is probably due to the variation in flow rates as the pulp loses velocity, and as the area of a horizontal section outside of the cone varies. This is the second shear in the vertical plane.

The paper mill operator will be most interested in the overall mixing effect,—that is, the summation of the mixing actions described in the preceding discussion. Dye added to the pulp in as much of a localized spot as possible will be drawn into the cone to reappear in two minutes or less. When it reappears, the effect is that of a uniform distribution of color over the entire surface of the tank. Close examination will reveal local but small spots of uncolored pulp. These completely disappear in approximately three circuits of the pulp, or usually within about three minutes and never over six.

For operation in horizontal chests, the cones are placed in a horizontal position with the outlets adjacent to each other in the center of the tank. The mixing action is essentially the same as that accomplished in the vertical chests and three complete circuits from the center to the ends and return, practically complete the mixing.

In observing draft-tube type agitation on low density stocks, in which a propeller drives the material out of the bottom of the tube to rise in the top of the tank between the tube and the wall of the tank, it appeared that color would show up in the surface of the outer chamber in a period only a little longer than that described in the action of the cones above mentioned, but this color was still localized. After the color had passed, a stream of white stock again appeared, the color gradually gaining and the white losing in volume until even dispersion of color was finally obtained. This seems to be the best indicated comparison between the newly developed cone type mixer and that of the draft tube variety.

In machine chest operation it seems best to provide two speed drives so that prompt and efficient agitating may be obtained at low speed with the advantage that violent agitation may, at a moment's notice be provided to instantly correct consistencies should a complaint come from the paper machine operator.

Occasionally a problem arises in emptying very large surge or storage tanks operated by horizontal propeller type, or vertical paddle type stirrers, because the last few inches of stock are not agitated, and, in draining, the water runs out of the stock, leaving it in piles on the bottom of the tank. It may not be possible to eliminate this difficulty in all cases, but it may be alleviated with cone type agitators, because, just as long as the lower opening or intake of the lower cone is in contact with the pulp, it will pump the stock and water over the top and discharge it toward the wall, thus continually rinsing the bottom.

Most careful research work was undertaken before the development of this new machine, experiments being run for a period of seven months, first in vertical tanks 36 inches in diameter by 36 inches deep, then in 5 foot by 5 foot tanks, and finally in the 10 foot by 10 foot tank to which reference has been made above. Consistencies up to 6½ per cent bone dry basis were handled with cones of various shapes and in various combinations, driven with variable speed drives mounted on dynamometer bases and then in a horizontal chest 4 feet wide by 4 feet deep by 8 feet long, this chest having a half round bottom. In each of these containers, both vertical and horizontal, all other well known methods of agitation were also installed and tested under identical conditions in order to make an exact comparison of the results obtained, and application for letters patent were deferred until experiments were completed and development work had been completed and definite results obtained. It now appears that rapid, efficient and simple agitation at reasonable first cost and at extremely low operating cost is now available for most paper stock requirements.

Industry Is About to
Merchandise Itself

WILLIAM K. OPDYKE
William P. Opdyke & Staff

THE chief penalty of being a "big industrialist", according to standards of the present time, is that most of your employees and neighbors lie to you! No one really tells you the truth about anything important. This is because they are afraid that unless they tell you exactly what you want to hear, you will be angry with them; possibly deprive them of something. This tendency to tell you only what you want to hear is soothing to the ears, but almost inevitably leads to such grievous blunders of policy that you may finish up deprived of honors, wealth, and other things.

In the field of employer-employee relations, exceptionally few top-notch executives know as much about their own company's wage-earners as they pretend to know about "mass markets." Employees (and stockholders) do a lot of "exclusive thinking" and a lot of talking these days. They also listen and read considerably. Most keen plant foremen and supervisors know what is running through the average employee's mind nowadays, but only a rare few will tell you the truth. The executive end of American business is therefore very much out on a limb today,—and it's the biggest price ever paid through the paymaster's window. Furthermore, cleverly conceived campaigns directed against business have been permitted to roll merrily on without so much as a peep from those who are being white-washed.

Oddly enough, the average American business man looked down upon any form of "protective politics." The mere word "politics" swiftly painted a picture of everything bad. An unfortunate attitude of smugness kept him from doing anything about making politics and politicians cleaner. This dangerous state of affairs caused several depressions in addition to considerable "class" misunderstanding. The latter must be cleared up before the former can be cleaned up. The present-day employee is living in a state of mental giddiness. He is told, by many factions, that the executive branch of business is merely a collection of "greedy and selfish sops." (That phrase is a popular one in certain propaganda circles.) Not daring to ask for the other side of the story, employees once tried to visualize the executive's position. But silence was believed "golden" on the part of many industrial leaders. That silence has caused great grief for employer and employee alike, and here we have another depression, brought about primarily by the fact that business has been "out-merchandised." Not even the best economists can present any tangible reason for a depression these days. It was and still is a "mere" matter of sentiment and public opinion. Sentiment creates public opinion and public opinion elects lawmakers. Lawmakers make laws, and laws govern business trends. A simple circle indeed!

A manufacturer wrote to the author the other day stating that he normally employs about two thousand people, but at present is working on a reduced force of from four to five hundred. He goes on to say that the C.I.O. has been attempting to organize his employees and have been quite active during the past few months;—started issuing a bi-weekly paper to his employees. That's *one* way to stimulate the paper business. If the C.I.O., for example, adopts merchandising tactics and campaigns for the promotion of its beliefs and theories without any sound "competition" on the part of those who disagree with them, it is to be conceded that employees have little alternative but to believe what they don't, at heart, want to believe. After a prolonged period of silence on the part of management, even the most conservative workers begin to resent the insult accorded them by not being furnished with your side of the story. Continued management refusal to lay cards on the table puts employees on the road to really dangerous sentiment.

Is it not sound and reasonable that clean-cut, honest, and interesting presentations of unbiased facts constitute businesses' greatest current job? And equally obvious that business must solve its individual problems of private relations with employees before it attacks the broader problem of public relations; that education and understanding should begin in one's own backyard; that when the executive branch of each business enterprise adequately explains and justifies itself to its employees, the public mood and its political reflection will be constructively altered?

A tangible medium through which both management and labor may express viewpoints on matters relating to respective, local activities is greatly needed by many plants today. I am not speaking of the old-fashioned employee house organ that resembled a high school "sheet" or yearbook. Neither am I suggesting an elaborate magazine. What I do advocate is the "scientific" application of professional editorial and illustrative presentation; a definite, "merchandisable" formula built along the same general lines as the editorial content of any successful, modern magazine. This is obviously a job for a specialist in this relatively new field of promotion. When properly done, employee publications form the nucleus of a constructive, "bankable" campaign.

Bear in mind that the modern employee house organ reaches not only employees, but their families and the community as well. A recent survey showed as high as eleven readers per copy. Today, the employee family is as important a sentiment factor as the employee himself. Furthermore, a paper that really appeals to recipients lasts long. In fact, many workers keep back issues for years. Have you not felt the constructive forces of your own favorite trade paper? "The power of the press" can be applied to your local problems too. If there are good things and good policies in your organization, is it not reasonable to suppose your employees want to see them in print; actually see them appropriately dramatized? You hear much about the value of showmanship in advertising and promotion material. Let's properly apply some of it to good business management before it's too late.

Now what about the cost of an employee house organ a la 1938? The answer, of course, depends upon the type of publication selected. Some reports show costs running anywhere from 80 cents to $8.00 per employee per year. Some organs run above the latter figure, but a good average figure is about $2.00 to $6.00 per employee per year.

The modern business promotion plan should recognize two distinct spheres of influence—the human relations which enter into the structure of the company, and the outside

(*Concluded on page 678*)

PAPER SKETCHES

THE FIRST PAPER FLOOR IS SAID TO HAVE BEEN LAID, IN 1884, IN A ROLLER-SKATING RINK IN INDIANAPOLIS, INDIANA. THIS FLOOR WAS MADE BY PRESSING STRAW-BOARD INTO BLOCKS, WHICH, WHEN SEASONED AND DRIED, WERE SAWED INTO FLOORING AND THE FLOORING LAID SO THAT ONE EDGE OF THE PAPER FORMED THE FLOOR SURFACE. . .
THE FIRST PAPER PATTERNS FOR CLOTHING WERE A SERIES OF MEN'S SHIRT PATTERNS CUT FROM STIFF PAPER AND PLACED ON THE MARKET IN 1863. SHORTLY AFTERWARD, TISSUE PAPER PATTERNS FOR CHILDREN'S DRESSES WERE ISSUED; AND THESE WERE FOLLOWED ABOUT A YEAR LATER, WITH PATTERNS FOR WOMEN'S MORNING WRAPPERS.
DURING ANCIENT ROMAN DAYS, DISCARDED SCRAPS OF PAPYRUS WERE COLLECTED AND RE-MANUFACTURED INTO A CHEAP PAPYRUS CALLED "CHARTA SUITICA"
ABOUT 78%
OF THE TOTAL NEWSPRINT CONSUMPTION OF THE UNITED STATES DURING 1937 WAS IMPORTED. OF THIS IMPORTATION, TOTALING 3,314,024 TONS, CANADA SUPPLIED BETWEEN 85 AND 90 PERCENT.

Fun and Knowledge Mixed Well at Tappi Convention

A. B. Hansen, General Chairman

HISTORIC Green Bay, top ranking center of the world's tissue industry, extended its hospitality as the pioneer community of the Northwest to members of the Technical Association of the Pulp and Paper Industry at their 1938 fall convention on September 8, 9 and 10.

Between 600 and 700 registered delegates and their wives and friends were loud in their praise of arrangements for the three-day affair, and many pronounced the diversified program of business and technical sessions and the numerous social activities the most profitable and enjoyable they had ever participated in.

Four interesting and goodly-attended technical sessions Thursday, Friday and Saturday were held in the Crystal Ballroom at the Hotel Northland, convention headquarters. Between times, the men and women enjoyed private luncheons at two of Green Bay's larger hotels, played golf and took part in a skeet tournament, spent some hours on historic tours and visits to mills at Green Bay and in the Fox River Valley and attended three elaborate banquets and balls.

Highlights of the social program were the Harvest Costume Ball at Riverside Pavilion the first evening of the convention, and the formal ball

Over 800 persons attended the formal dinner-dance at the Riverside Ballroom. The speakers' table in the foreground includes, left to right, Clarence A. Dykstra, president of the University of Wisconsin and main speaker; A. B. Hansen, of Northern Paper Mills, general chairman of the convention; Mrs. Harry Gochnauer, wife of the chief engineer at Northern Paper Mills, chairman of the women's program; W. J. Servotte, Bay West Paper Company, assistant general chairman; J. M. Conway, president of Hoberg Paper Mills, Inc., program chairman; D. G. Moon, consulting engineer, and E. A. Voightman of Northern, chairman of mill visits.

University of Wisconsin's President Clarence A. Dykstra, main speaker at the formal banquet, converses with Frank P. Vaughan (right), banquet toastmaster.

and banquet at the same place the second night. As a finale on Saturday afternoon and evening, the delegates motored 70 miles to Maxwelton Braes resort, overlooking Lake Michigan in Door County's famous "Cherryland," for an afternoon of golf, bridge and a dinner which was interspersed with special entertainment.

PROMPTLY at 10:15 Thursday morning, September 8, Tappi President Fredric C. Clark of Newton, Mass., opened the general convention session and delivered his message of welcome. Following the technical papers that morning, men enjoyed a stag luncheon at the Northland, presided over by J. M. Conway, president and general manager of Hoberg Paper Mills, Inc., Green Bay, and featuring an inspirational address by D. C. Everest, president of American Paper and Pulp Association, and vice-president of Marathon Paper Mills at Mosinee.

"On behalf of the American Paper and Pulp Association, I wish to thank Tappi and all its members for everything they have contributed to the industry," Mr. Everest told the meeting.

"What we need," he continued, "is some technical knowledge expended on the development of new uses and the finding of ways to utilize the great quantities of paper products now available. I believe we have need today for a new order of technicians, and the new paper engineer will not supplant the present technical man."

The paper industry today is confronted with more regulatory measures imposed by government than ever before and most of these are problems for the management, he stated, but he pointed out that in at least one problem, stream pollution, members of Tappi had given valuable assistance in working out a policy for handling pollution before and undoubtedly will be called upon again to aid in the work during future studies.

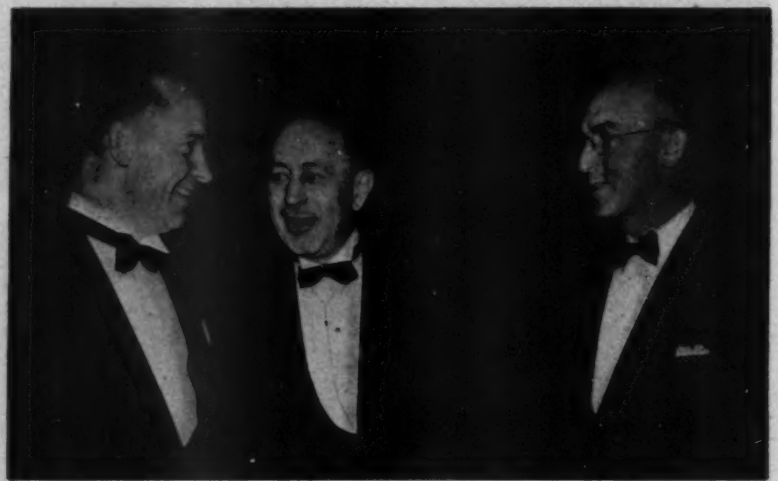
C. C. Heritage of the Wood Conversion Company presided as chairman of the Forest Products Laboratory session in the afternoon on Thursday, and at the Institute of Paper Chemistry meeting Friday morning Howard Morgan of the Institute of Paper Chemistry at Appleton, served as chairman. An informal luncheon for the men was held that noon at the Northland Hotel.

ANOTHER especially interesting and educational address was heard by more than 700 at the formal dinner-dance Friday evening at Riverside. The speaker was Clarence A. Dykstra, president of the University of Wisconsin and formerly city manager of Cincinnati, Ohio. He spoke of experiences obtained during the summer from a European tour and gave a detailed outline of the social, economic and political scenes and their status as they were brought to him, and then contrasted them with the American outlook. Toastmaster for the occasion was Frank P. Vaughan, general manager of Bay West Paper Company at Green Bay.

Beautiful Riverside Ballroom was gayly bedecked for the party with fall flowers and the colorful formals of the ladies formed a pleasing contrast to the black but brilliant dinner clothes worn by the men as couples danced into the early morning hours to the pleasing rhythm of Bill Carlsen and his N.B.C. broadcasting orchestra.

The Harvest Ball on Thursday evening was considered by many the most entertaining of any convention, in recent years at least. Appropriately timed with the arrival of autumn in northern Wisconsin, the costume party was preceded by a festival dinner and most of the 500 attending came in overalls, calico dresses and wide-brimmed straw hats so familiar in the country.

Silhouettes of typical farm scenes decorated the ceiling and upper structure of the huge ballroom and around the facade were cornstalks and tall sunflowers. Focal point of the "harvest-goers" as they entered the hall was a "horn of plenty" in which were gathered fruits of the harvest. Bill Carlsen also played the first evening for the



President Fredric C. Clark (center) chats with A. B. Hansen (left) and J. M. Conway (right) before the formal dinner-dance.

The sweet music of Bill Carlsen's far-famed band has H. L. Nichols, assistant sales manager of Northern Paper Mills, and Mrs. Nichols, dancing rhythmically at the Harvest Ball.

Pretty farmerettes form the background for this Harvest Ball festival scene which shows the fruits of the harvest pouring from huge cornucopias. The "rural belles" are, left to right: Mrs. A. D. Murphy, wife of the convention vice-chairman; Mrs. Charles Belvin of Portland, Ore.; Mrs. Robert Kissel of the ladies' committee; Mrs. Gerald Hopkins, wife of the assistant treasurer of the Hoberg Mills; Mrs. John Mohr, whose husband is associated with the Chromium Corporation, Chicago, and Mrs. Irvin Damon, wife of a Northern Mill salesman.

These scarecrow costumes worn by Mr. and Mrs. W. J. Servotte of Green Bay, won first prize at the Harvest Ball costume festival. Mr. Servotte was assistant general chairman of the convention and his wife was on the ladies' committee. At the right is N. L. Malcove, arrangements chairman.

Harvest Ball and each evening a section of the Green Bay Y. M. C. A. Glee Club, former national champions, entertained with appropriate vocal numbers. A floor show was featured both evenings and there were a number of other dancing, singing and specialty acts.

The scarecrow costumes worn at the ball by Mr. and Mrs. William Servotte won first prize, Mr. Servotte receiving a beautiful saddle-brown leather Gladstone bag with a zipper top and Mrs. Servotte being given an attractive leather overnight case. Mr. Servotte is assistant general manager of Bay West Paper. A. G. Stone of Southern Kraft Corporation, York Haven, Pa., and Mrs. Stone were awarded second prize for their Amish couple costumes, while Mr. and Mrs. D. G. Moon of Savannah, Ga., co-chairmen of last year's convention, were third with hillbilly outfits.

Donors of prizes and souvenirs for the costume party and golf and skeet tournaments were: Louis Allis Com-

LEFT—Swingin' it in overalls, calico gowns and plaid jackets. That's George Nau Burridge of Hoberg and Mrs. Burridge of the ladies' committee in the center. RIGHT—"Rubetowner" Larry Lynd of the R. T. Vanderbilt Company of Kalamazoo, (left) finds it helps a lot if one uses mashed potatoes to keep peas on a knife, while Sam Anderson, of Hooker Electrochemical Company, has already mastered the art of eating with the bare blade. The scene was the Harvest Ball.

LEFT—President D. C. Everest of the American Paper and Pulp Association, addresses the stag luncheon. CENTER—Dr. C. E. Curran of Forest Products Laboratory, addresses a technical session. RIGHT—Another Forest Products man, Dr. G. J. Ritter, talks at the Friday afternoon session.

pany, Appleton Woolen Mills, Arabol Manufacturing Company, Beloit Iron Works, Black-Clawson Company, Central Scientific Company, General Dyestuff Corporation, Globe Steel Tubes Company, Green Bay Box Company, Harbison-Walker Refractories Company, Hooker Electrochemical Company, F. C. Huyck and Sons Company, Industrial Supplies Company, International Filter Company, Johns-Manville Corporation, Link Belt Company, Mason-Neilan Regulator Company, Michigan Steel Casting Company, National Aniline and Chemical Company, National Vulcanized Rubber Company, Pennsylvania Salt Manufacturing Company, Schlafer Supply Company, Shartle Brothers Machine Company, Texas Gulf Sulphur Company, Valley Iron Works Company, Wadhams Oil Company, Wallace and Tiernan Company, Inc., Walworth Company, Wilkens-Anderson Company and Williams-Gray Company.

An attentive crowd attended the first general session.

DESPITE light but almost continual rain the first two days, golf enthusiasts were not to be deprived of their game at the tournament at Oneida Golf and Riding Club on Friday afternoon. The weather cleared for a time during the matches, however, and there were several scores who braved the elements to go around the difficult 18-hole course. The women's golf matches scheduled Friday morning were called off, however, because of the weather. Both men and women had a full afternoon of the sport Sat-

LEFT—A paper on absorption of SO_2 in water is read by Charles E. Reilly of Kimberly-Clark Corporation. CENTER—G. H. Chidester of Forest Products Laboratory illustrates his point from a wall chart. RIGHT—Ray Riley of The Permutit Company, discusses the latest development in water softening.

TO PAPER-MILL OPERATORS SEEKING RELIABLE, EFFICIENT DRIVES

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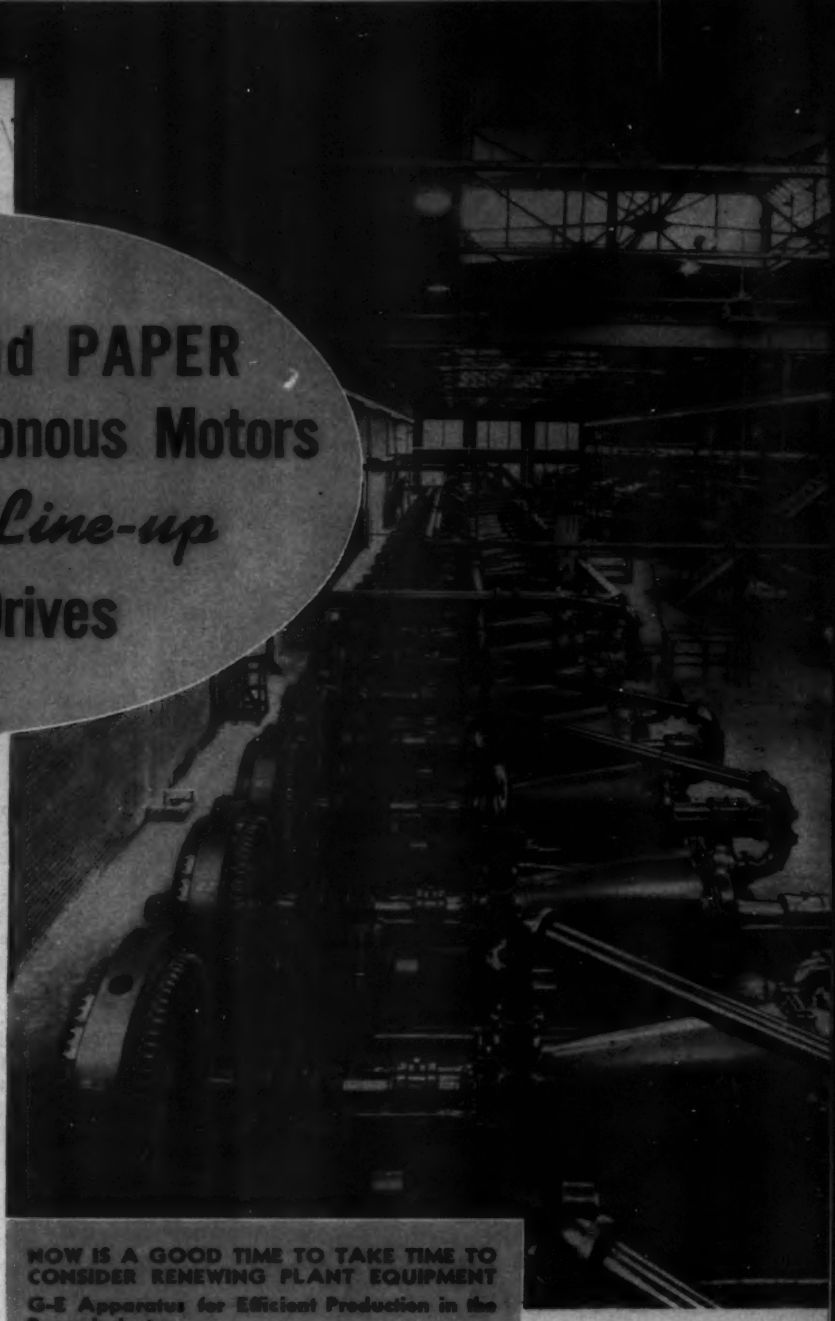

YOU are looking at what is believed to be the longest mill line-up of synchronous motors—the largest single installation in the paper industry. This row of thirty-four 350-hp motors represents a total of 11,900 horsepower at work for Union Bag and Paper in its new kraft mill at Savannah, Georgia, where three paper-machine units are now in operation.

This is another of many applications, both large and small, in which General Electric synchronous motors have been chosen for reliable and efficient Jordan drives. In fact, more Jordans are driven by G-E synchronous motors than by synchronous motors of any other make. Why? Reasons differ, of course, but here are a few significant advantages in specifying G-E motors:

Built to Last

The frame is so designed as to minimize vibration and to assure long motor life. Special insulation, developed in G-E laboratories, safeguards the windings. Synchronous motors help boost plant power-factor, thus increasing the over-all electrical efficiency.

Services Conveniently Available

G-E engineers specially trained in the application of these motors and other equipment in paper mills will assist you in selecting the electric apparatus for your plant. Service to the paper mill is available from a nationwide organization of 78 sales offices, 28 warehouses, and 19 service shops.

For specific information on synchronous motors, and on any equipment for the generation, distribution, or utilization of electricity, get in touch with the General Electric office nearest you, or write General Electric, Schenectady, N.Y.

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- ___Photoelectric register control and other "electric eye" devices
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GENERAL ELECTRIC

It rained during the golf matches at the Oneida Golf and Riding Club, but this "do or die" foursome just rolled up their trousers and went around anyway—with the aid of an umbrella. Left to right—H. A. Morrison of Oliver United Filters; C. W. Crumb of the same firm; C. L. Clark of Nash Engineering, and M. M. Klosson of Buffalo Pumps, Inc.

urday on the Maxwelton Braes course.

Golfing laurels were won by W. F. Kerwin of Green Bay, chairman of transportation. He was given a silver cup for carding a 78 low gross score among members. D. M. Irwin, of Chase Brass at Milwaukee, went the 18-hole Oneida course in 81 and won low gross for salesmen. The low net among members was 87, shot by A. B. Hansen, general manager of Northern Mills and convention chairman, while C. C. Bleil of Du pont Chemical at Chicago, went around in 97 for low net among salesmen.

Winners of the women's bridge tourney Thursday afternoon at Rockwood Lodge were: Mrs. William Plank, Appleton; Mrs. F. A. Parcoe, Wisconsin Rapids; Mrs. M. J. Freeman, Chicago; Mrs. E. J. Yimmerman, Green Bay; Mrs. Pierre Drewson, Sandusky, O., and Mrs. Mary Gore, Green Bay.

A skeet and trap shoot at Bay Beach on Friday afternoon was won by G. A. Koebke of Manitowoc, Wis. He hit 22-20—42 in skeet and 21-19—40 in trapshooting to win both events. Second prize was won by Ivar Ekholm, of National Aniline Company at New York; third high was E. P. Gleason of Nekoosa-Edwards; fourth was Ted Olson, also of Nekoosa-Edwards, and Milan Boex, sales manager of Northern Mills, scored fifth.

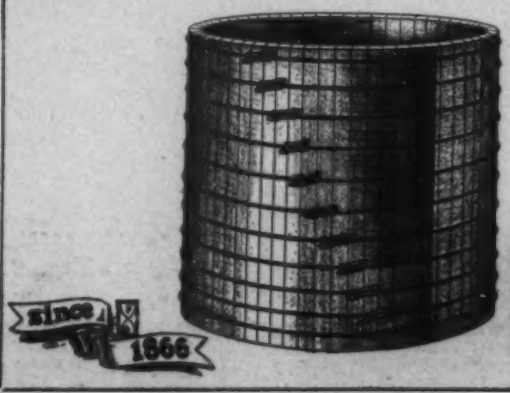
The women's program, in charge of Mrs. H. W. Gochnauer, wife of the chief engineer of Northern Paper Mills, Green Bay, formally opened at noon Thursday with a luncheon at the Beaumont Hotel and late that afternoon the group was entertained at a tea at the Oneida Golf Club. Friday afternoon the ladies enjoyed a luncheon and bridge at Rockwood Lodge overlooking the bay and on the way there a brief pause was made at Nicolet Landing in Red Banks, where Jean Nicolet, famous French explorer, became the first white man to set foot on the soil of the Middle West 304 years ago in 1634. On the final day of the convention the ladies were taken in chartered buses and private automobiles to Door County ahead of the men and they were entertained at luncheon in Eagle Inn at Ephraim on the Green Bay side of the peninsula. Highlights of the special entertainment at the last dinner at Maxwelton Braes was the program offered by Miss Lucille Meusel, Green Bay coloratura soprano and star of the San Carlo Opera Company.

Although the convention ended Saturday evening, upwards of 200 remained in Green Bay overnight and Sunday to enjoy the national league professional football game between the Green Bay Packers, four times national champions, and the Cleveland Rams. The delegates had a special section in City stadium for the game which inaugurated the league season at Green Bay.

PACIFIC TAPPI PLANS MEETINGS

A series of dinner meetings will be held by the Pacific Section of the Technical Association of the Pulp and Paper Industry during the winter, it was announced recently. At each meeting there will be one technical paper and a talk on some general business subject relating to the industry.

To encourage the younger men in the industry to present papers at the dinner meetings, the Section will offer a prize of fifty dollars for the best paper presented at one of these meetings by a man not previously having presented a paper at a Section meeting.



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Brown Flow Meters record flow in volume units of pounds, gallons, barrels, cubic feet, etc.

with Brown Flow Meters on the Job

These illustrations taken from the practical experience of users of Brown Flow Meters demonstrate the savings that can be made in the average plant by metering steam, air, oil, gas and other fluids.

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WAGE AND HOUR LAW SUBJECT OF CONFERENCE

THE manner in which the American paper industry shall approach the problems resulting from the enactment of the wage and hour law, as well as to its procedure on other governmental problems, was the subject of an industry meeting under the auspices of the American Paper and Pulp Association at the Hotel Waldorf-Astoria on Thursday, August 25.

A broad attitude of co-operating with government agencies to secure a true picture of industry conditions was determined upon in the wage and hour law situation, as well as in other similar problems still to be faced.

As a matter of policy the paper industry will ask that the industry committee to fix wage and hour standards be limited to nine, of which three would represent labor, three the industry and three the public, and a move will be initiated to have the industry representatives authorized to act for the paperboard and newsprint industries, as well as those divisions under the aegis of the American Paper and Pulp Association. The immediate compilation of factual statistics as to wages and hours now prevalent in the industry was the first step toward the beginning of conferences with the industry committee, when such a committee is formed.

A minimum of requests will be filed with the Industry Committee, to include provision for tolerances for apprentices, adjustments to take care of problems coming in the field of continuous operation industries, such as exchanges of working hours between employees on account of illness or similar conditions, exclusion of seasonal operations from the normal provisions for hours and rates of payment, and the exemptions of office employes, foremen and professional workers such as nurses and chemists from the operation of the Act.

In opening the meeting, D. C. Everest, president of the Association, pointed out that the industry was facing regulation in many forms, and that present conditions were such as to demand industry action in its own protection. For instance, he showed that in 1937 production totaled one million tons more than in 1929, but with approximately an equivalent return for the product, or a year of great prosperity was at the loss of 15 per cent in prices at a time when wage costs and raw material costs were increasing.

The Association has authorized its staff to provide the so-called anti-monopoly committee all necessary facts about the industry's history, methods and operations, as it was felt that a correct appreciation of the industry's problems would eliminate it from antagonistic action when this congressional committee makes its report.

A renewed effort to secure stream control legislation of the study type will be renewed at the next session of Congress, following the veto by President Roosevelt of such a type of legislation passed by the last Congress.

A federal investigation of forestry conditions, particularly with reference to the proposals for government control of private woods operations is now under way, and the industry is preparing to present its attitude on this problem when the conferences are held in the pulp-wood producing districts.

The need for national opposition to proposed legislation in many states imposing registration fees on trade-marks and advertising slogans was also emphasized.

The Technical Association of the American Paper and Pulp Association was authorized to proceed along the general lines outlined at the meeting when conferences begin with the authorities named to put the wage and hour law into effect.

CONVENTION PAPERS . *Abstracted*

The following abstracts are of papers presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, September 8-10, 1938, at Green Bay, Wisconsin.

A New Conductivity Instrument and Method for Analyzing Kraft Liquor

E. R. WHITTEMORE,[1] S. I. ARONOVSKY[2] and D. F. J. LYNCH[3]

The conductometric titration apparatus developed in the U. S. Agricultural By-Products Laboratory at Ames, Iowa, is based on the principle that current at constant potential is directly proportional to conductivity. The apparatus consists of a few pieces of inexpensive radio-type equipment and employs 60-cycle lighting current. A single adjustment is all that is required for a direct numerical reading which can be plotted to obtain the titration curve. While specific conductance values may be calculated from these data, they are unnecessary because the titration end points may be obtained directly from the plotted curves.

The methods of kraft liquor analysis in common American practice are those of Sutermeister, Kress, Cirves, and of Heath, Bray and Curran. Experience with the colorimetric methods has shown that the end points are obscure and indefinite. This is due to the presence of dark-colored organic extracts and indicator-like substances, and to the reducing action of organic matter on the iodine or other oxidizing agents. Back titration is usually necessary to secure good results with iodometric procedures.

Conductometric titration has been applied to the analysis of kraft liquor with excellent results. This method effects a great saving in time, and the results are as reliable as those obtained by the long, tedious, chemical procedure.

The simplified method of conductometric titration may be used in general routine and research, particularly where economy of time is essential or where dark or turbid solutions are encountered.

1, 2 and 3U. S. Agricultural By-Products Laboratory, Ames, Iowa

The Absorption of SO_2 in Water

CHAS. E. REILEY[1]

The theory of gas absorption has undergone much revision and clarification in the literature in the past several years, the two-film theory having been accepted universally as the logical explanation of the mechanism of this diffusion process. The information reported in this paper is another case of the passage of SO_2 over a free surface of water. In this case, the absorption tower was packed with a series of wood-lattice

[1]Chemical Engineer, Kimberly-Clark Corporation, Neenah, Wis.

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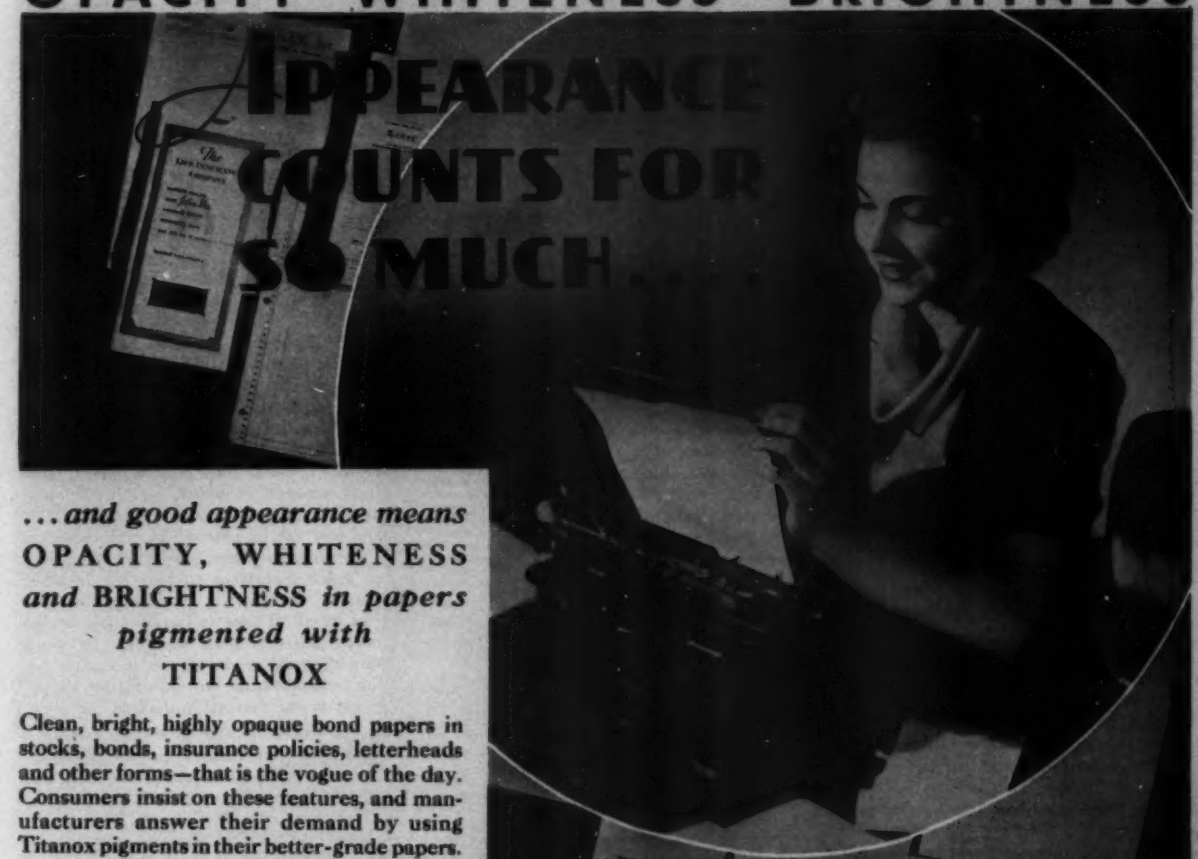

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grids, each unit laid at a 90 degree angle to the preceding packing unit. The tower was one unit of a standard mill installation designed to concentrate SO_2 gas from a spray-type sulphur burner.

Rates of gas flow were calculated from the change in gas and liquor concentrations during passage through the absorber and from the liquor rate. Liquor rate was controlled by means of a hand valve which was set to allow the desired rate of flow as indicated on a manometer used in conjunction with a standard orifice. Liquor rate was maintained constant during any given run and was the only controllable variable. Since the absorber was actually engaged in plant production operations, it was not possible to study the effect of temperature on gas absorption, mill conditions making it essential that the absorber temperature be held at a minimum.

Inlet and exit gas pressures were measured with the usual mercury manometers. Atmospheric pressure data were obtained from the Wisconsin-Michigan Power Company. Inlet liquor temperature was determined by means of a thermometer in an oil-filled well, while a thermometer was placed in a bottle of the liquor to obtain the exit liquor temperature. Orsat apparatus was used to determine gas composition, employing mercury as a leveling medium and chromic acid as the SO_2 absorbent.

The effect of gas velocity on the rate of SO_2 absorption was first investigated by maintaining the liquor rate constant at each of four velocities—15, 20, 25, and 30 gallons per minute (corresponding to 1.49, 1.99, 2.48, and 2.98 feet per minute), and obtaining a correlation of gas velocity to overall absorption coefficient. Increasing gas velocity and liquor velocity produced an increase in rate of absorption, the former being of greater importance at the higher liquor rates and the latter being of most importance at low liquor velocities, while an increase in temperature decreased the rate of absorption. The overall absorption coefficient was found to vary with the 1.42 power of liquor velocity, and with the 1.26, 2.11, 2.17, and 2.26 power of gas velocity at liquor velocities of 1.49, 1.99, 2.48, and 2.98 feet per minute respectively.

Latest Development in Water Softening —Carbonaceous Zeolite

RAY RILEY[1]

Zeolites have been used for approximately 30 years in this country and abroad for water softening.

The term, "zeolite," was originally a mineralogical name for a specific group of substances; but, as now used in the water conditioning field, it has been broadened to include any hard granular material through which the water percolates and which reacts chemically with the water, without going into solution so that certain cations, dissolved in the water, such as Ca., Mg., Fe., etc., are exchanged for cations in the zeolite, such as sodium, etc., and which may be regenerated by reversing the reaction in repeated cycles.

Carbonaceous zeolites, the latest member to be added to this group of zeolites, consist mainly of carbon. The carbonaceous zeolite "Zeo-Karb," is manufactured from coal by a treatment with chemicals, which may include sulphuric acid or sulphur trioxide, and after which it is washed, stabilized, and screened.

When regenerated with sodium chloride, a carbonaceous zeolite functions as a sodium zeolite. Its exchange capacity is 5,000-8,000 grains of hardness removal per cubic foot, depending on the relative amount of salt used for regeneration, It is completely resistant to aggressive attack by waters of low pH and can be used to satisfactorily soften either hard or relatively soft waters.

The concept of hydrogen zeolite is not new. However, the siliceous zeolites available until recently would not withstand mineral acids to convert them into hydrogen zeolites. The advent of the new carbonaceous zeolites, which can be used in the hydrogen cycle, because of their complete resistance to acids, ushers in a new chapter in zeolite water treatment.

The carbonaceous "base exchanges" have found the following applications for water softening; waters of low pH value (under 6.5), waters high in iron, limited space for softeners, water low in SiO_2, and softening after silica removal.

The carbonaceous "hydrogen exchangers" accomplish the removal of sodium bicarbonate, of calcium bicarbonate, and of magnesium bicarbonate.

In the pulp and paper industry, as in many other industries, one of the most important problems is the conditioning of the boiler feedwater. The earliest method used was the cold lime-soda treatment. The next step was to heat the water to accelerate the chemical reactions and drive them further toward completion—the hot lime soda softener. Next, sodium zeolite treatment was developed and used because the hardness is reduced practically to zero. In some plants, cold lime treatment followed by acid precedes the zeolite.

Hydrogen zeolite is a recent advance step in the chemist's endeavor to produce a treated water of minimum hardness, alkalinity and dissolved solids.

The alkalinity of the water from a Zeo-Karb plant can be controlled by neutralizing with alkali, by neutralizing with a softened water containing sodium bicarbonate, and by by-passing raw water.

With hydrogen zeolite it is possible to completely remove the calcium and magnesium cations and the removal of bicarbonate anion is effected by degasification of the hydrogen zeolite treated water by removal of CO_2.

The next step, already under investigation for several years, is a zeolite for the removal of the chloride and sulphate anions. This anion removal is accomplished by a two-step process known as "demineralizing."

A number of two-step "demineralizing" plants, operating on different types of waters, have been installed in various parts of the country. After a successful proving period in the field, this method will be available for commercial usage to produce a water containing only a few p. p. m. dissolved solids.

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The Washing of Bleached Sulphite and the Introduction of a New Method for Its Control*

HERBERT PRELINGER[1]

In recent years, the washing of bleached pulps has assumed an importanuce equal to that of the bleaching itself. The most efficient bleaching might produce an unattractive sheet in case the products of the bleaching reactions are incompletely removed by washing. Pulp of such quality is exposed to a serious reversion in color.

Additional washing given a pulp already reverted in color will, in most cases, produce no higher color, because the residual impurities contained in the reverted pulps seem to behave chemically quite differently than those in pulps immediately after bleaching. However, when such pulp is treated with small amounts of bleach liquor, the residuals are oxidized again, rendered soluble and now can be removed by washing.

In order to insure proper washing, it is of great importance to soak the bleached pulp at relatively low consistency for a certain length of time and under constant agitation previous to its washing. By doing this, the pulp is placed in such a state that the residual liquid can diffuse from the internal to the external surface of the fibers.

The length of time given for soaking is of greatest importance. In case of insufficient and improper soaking, the bleaching residues diffuse incompletely from the inner surface (lacuna) of the fibers to the outside layers. Consequently, they are not completely removed by the mechanical act of washing. Such pulp, when stored either wet or dried, reverts quickly and seriously in color.

The two conventional methods of determining the efficiency of washing are based either on the ash content of tne washed pulp or on the degree of its color reversion. Neither method, although frequently in practical use, will produce reliable results from which definite practical conclusions can be drawn.

A method, not only suitable for the control of washed pulp, but also permitting the determination of the organic matter rendered soluble at any time of the bleaching and chlorination operation, has been worked out with potassium iodate as the oxidizing agent. The potassium iodate is used in known but excessive amounts. After completion of the reaction (which proceeds at elevated temperature), the excess of iodate is determined by means of potassium iodide which frees iodine. The liberated iodine is titrated with sodium thiosulphate as usual.

The thiosulphate equivalent to the initial amount of potassium iodate minus the thiosulphate required in the titration of the treated sample gives a difference which is the amount of iodate required for the oxi-

*Presented by title.

[1]Member TAPPI, Research Chemist, Camas Mill, Crown Zellerbach Corp., Camas, Washington.

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dation of the organic substances. This amount of potassium iodate used is expressed in terms of oxygen which corresponds to the organic substances present in the residual liquor.

Generally speaking, pulp being sufficiently well washed may be characterized by an oxygen number not exceeding 6.0 (milligrams of oxygen consumed by 100 cc. of the residual water). The application of the oxygen number is not restricted to an inspection of the efficiency of the washer operation alone. An important application lies in the field of inspecting the degree of opportunity for proper diffusion or soaking before the washer is reached.

In application of the method an as aid in control of pulp washing, the author cautions that standards applicable to the operation of any particular bleach plant, and representative for various grades of bleach pulps, would need to be worked out to fit the requirements of low conditions of each individual mill.

Effect of Age and Growth Rate on Sulphite Pulps from Western Hemlock

G. H. CHIDESTER[1] and J. N. McGOVERN[2]

Five trees were selected by the Pacific Northwest Forest Experiment Station to represent as nearly as possible the range of the properties of age and growth rate found in western hemlock pulpwood—old having slow and rapid rates of growth, young having slow and rapid rates of growth, and very young, very rapid growth. Yields and properties of the pulps from each of the five trees were determined by digestions of middle logs from each type of tree. The two old-growth and the two young-growth woods were pulped at the same time; as were the very young, very rapid-growth wood and the old-rapid-growth wood. Bleach requirements of the pulps were determined by the single-stage hypochlorite method using the amount required for a blue color of 85 Ives parts as the standard for comparison. Both pebble mill and beater tests were made on the combined pulps according to a standard procedure.

Yields of pulp from the five trees varied from 43.2 per cent to 48.1 per cent on a weight basis and from 10.1 to 13.3 pounds of pulp per cubic foot of solid wood. The yields from the old trees were generally lower than from the young trees, and decreased with increasing springwood content, increasing rate of growth, decreasing density, and decreasing cellulose contents.

Close agreement in the bleach requirement of the pulps indicate the same ease or rate of pulping, at least under the conditions used, for all the woods, regardless of age, class, growth rate, density, or springwood content.

The bursting and tensile strengths of the pulps increased with increasing springwood content, increasing rate of growth and decreasing density. Tearing strength decreased markedly with increasing springwood content, increasing rate of growth, and decreasing density. The tearing strengths of pulps from the old trees were somewhat lower than those of pulps from the young trees.

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[2]Asst. Technologist, Forest Products Laboratory, Madison, Wis.

Chemistry of the Alkaline Wood Pulp Processes

V. Effect of Chemical Ratio at Constant Initial Concentration and the Effect of Initial Concentration on the Rate of Delignification and Hydrolysis of Douglas Fir by the Sulphate Process.

SIDNEY L. SCHWARZ[1] and MARK W. BRAY[2]

Sawdust prepared from sound 4-foot bolts of Douglas fir and which passed through a 40 and was retained on a 60-mesh sieve was collected for the pulping experiments. The cooking liquor consisted of a mixture of sodium hydroxide and sodium sulphide with the two chemicals in the ratio of 3:1 respectively. Digestions were made in a 350 cc steel autoclave which was heated by means of a thermostatically controlled oil bath.

Six series of pulping tests, consisting of four digestions each, were made at 170 degrees C. to determine the effect on rate of pulping of changing the ratio of chemical to wood from 15 to 60 per cent. In addition, one 4-hour digestion at 80 per cent of chemical was made. In all experiments, the total initial concentration was 60 grams per liter.

The study of the effect of changing the initial concentration of chemical in the cooking liquor on the rate of pulping was carried on in such a manner that, in one series of digestions, the quantity of chemical was insufficient to promote complete delignification in another, it was; sufficient; and in a third, it was in considerable excess of that necessary to complete the pulping reaction. In all series the concentrations were varied in increments of 20 grams per liter.

Increasing the ratio of chemical to wood increased the velocity of the removal of both lignin and cellulose, however, from a purely pulping standpoint, increasing it beyond 30 per cent of the weight of wood charged did not produce any material gain so far as purity of pulp was concerned. Nevertheless, with ranges, the time necessary to produce a pulp of a given degree of purity was approximately halved by doubling the ratio of chemical to wood.

It was found that the greater the concentration of chemical in the cooking liquor, the more rapid the rate of dissolution of the wood. This effect was not so apparent in the series where only 15 per cent of chemical was added; but, in the series where digestions were made with 30 per cent total chemicals, greater changes in yields resulted for a given time of pulping as the concentration was varied. In the series where the chemical to wood ratio was 60 per cent, the effect of concentration was similar to that of the 30 per cent series but to a much greater degree.

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[2]Senior Chemist, Forest Products Laboratory, Madison, Wisconsin.

From the standpoint of fiber properties, it appears that cooking at the lowest possible temperature with an infinite chemical to wood ratio, and at the lowest possible concentration (consequently, the longest period of digestion) would be the best procedure in order to secure fibers in which but little change in size of the micelles should occur. From an economy standpoint, however, cooking should proceed at the highest possible temperature, with the lowest ratio of chemical possible, and at the highest possible concentration (consequently, the shortest period of digestion) to obtain the lowest cost pulp.

In regard to mathematical representation of yield data, it appears beyond reasonable hope to expect future work and effort along the established lines to produce a desired mathematical representation in terms of ratio of chemical to wood, concentration of cooking liquor, and time of digestion.

Effect of the Addition of Sodium Salts in Pulping Shortleaf Pine with Neutral Sodium Sulphite Liquor

G. H. CHIDESTER[1] and J. N. McGOVERN[2]

Very strong light-colored, bleachable shortleaf pine pulps were produced by cooking with liquor containing neutral sodium sulphite alone or with the addition of relatively small amounts of sodium bicarbonate, sodium sulphide, or sodium hydroxide to give a pH range from 8 to 11. The digestions were made in a steam-jacketed autoclave lined with stainless steel, and having a volume of approximately 1½ cubic feet. Approximately 10.5 pounds of shortleaf pine (Pinus echinata) chips were used with 8 gallons of liquor containing 138 grams per liter of sodium sulphite in all instances under conditions which had been established as satisfactory. The digester temperature was brought to 180 deg. C. in 3 hours and held there for 6½ hours. The maximum pressure ranged from 135 to 145 pounds per square inch without relief.

In general, the results were similar irrespective of the secondary reagent used, the greatest difference noted being the lower bleach requirement of the pulps prepared with the addition of sodium sulphide. This low bleach requirement was apparently obtained at some expense of pulp yield.

By way of comparison the same technique was applied to a number of other species (five conifers and four hardwoods), and even better pulps were produced than from shortleaf pine. The conifers in the study included slash pine, jack pine, white spruce, Douglas fir and eastern hemlock; the hardwoods—aspen, black gum, yellow birch and hard maple.

The strengths of the pulps from eastern hemlock, jack pine, and white spruce appear exceptionally high. More remarkable perhaps is the color and strength of the short-fibered hardwood pulps. The maple pulp, for example, was exceptionally light-

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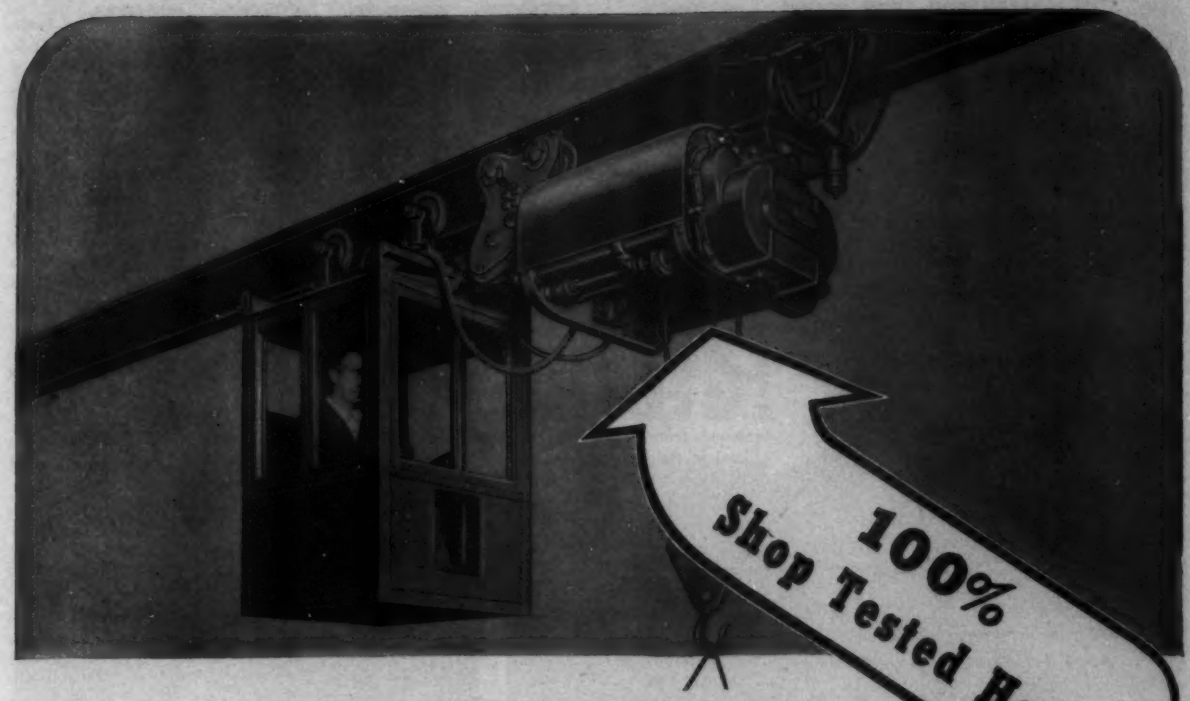

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colored for the species; and yellow birch gave bursting strengths not far below those of an average kraft pulp from pine.

Sulphite Pulps from the Top, Middle and Butt Logs of Western Hemlock of Four Growth Types

J. N. McGOVERN[1] and G. H. CHIDESTER[2]

The relation between the vertical positions of wood samples in western hemlock trees and the yield and properties of sulphite pulp was examined experimentally by means of digestions of the top, middle and butt logs of four growth types. The temperature schedule consisted of a rise to 110 degrees C. in 1.5 hours, holding at that temperature for an additional hour, a rise from 110 to 140 degrees C. in 1.5 hours more, and holding at 140 degrees C. for 5.5 hours; the total digestion time being 9.5 hours. The acid contained 5.5 per cent total and 1.15 per cent combined sulphur dioxide. Maximum pressure was 75 pounds per square inch. Indirect steam only was used.

Use of four baskets in each digestion enabled the pulping of either the top, middle, or butt portions of the wood of the four growth types (old and young rapid growth, and old and young slow growth) at the same time. Digestions were carried out in the customary manner in semi-commercial pulping equipment of 50 pounds capacity.

The bleach requirement of the pulps was determined by the single-stage, hypochlorite method. The amount of standard bleach powder necessary to bleach the pulp to a standard color of 85 parts blue, using the Ives tint photometer, was used as the standard of comparison.

Both pebble mill and beater strength tests were run on the combined pulps, the processing and testing following standard TAPPI methods.

Results of the investigation showed significant differences in yield and quality of pulps from the different portions of the trees, particularly with respect to the top logs. The pulp yield followed the trend of the cellulose and alpho-cellulose contents, which decreased from the butts to the tops, as did the proportion of summerwood, but appeared in no way related to the respective densities of the top, middle, and butt logs. No other regular variation was noted in the physical or chemical properties of the wood samples with respect to their positions in the trees.

Bursting strengths of the pulps from the top logs were slightly inferior to those from the middle and butt logs while tearing strengths were substantially lower in accordance with the trend toward a higher springwood content. Tensile strength, on the other hand, increased from the butts to the tops.

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Sulphite Pulps from Heartwood and Sapwood of Several Growth Types of Western Hemlock

J. N. McGOVERN[1] and G. H. CHIDESTER[2]

Yields and properties of pulps from heartwood and sapwood were compared by means of sulphite digestions of western hemlock of three growth types—young, rapid-growth wood; old, slow-growth; and very young, very rapid-growth wood.

Heartwood from the young rapid-growth wood was pulped slightly more slowly than the corresponding sapwood as shown by higher bleach requirements—2 to 3 per cent—of the heartwood pulps produced at 140 and 148 degrees C.; while heartwood and sapwood from the other two types were pulped in the same time as shown by identical pulp bleach requirements.

Pulp yields from the sapwood were higher (from 3.2 to 6.7 per cent) than those from the corresponding heartwood for all the types of wood digested. For evaluation, the various pulps were bleached and tested according to methods standard at the Forest Products Laboratory.

In general, the heartwood pulps had higher bursting and tensile and lower tearing strengths than the corresponding sapwood pulps.

When the young, rapid-growth heartwood and sapwood were pulped at 148 degrees C., the resulting pulps had the same initial bursting strength, but as the pulps were processed in pebble mill the heartwood pulp immediately developed a higher bursting strength value and maintained this advantage throughout the milling (both pulps being milled at the same rate). When these same woods were pulped at 140 degrees C., the heartwood pulp had a higher initial bursting strength and a higher early developed strength, but had the same maximum strength of the sapwood pulp.

Beater tests of the heartwood and sapwood pulps from the old, slow-growth wood showed the heartwood pulp to have a considerably higher bursting strength at two processing freenesses (800 cc and 550 cc); while beater bursting strength tests of the heartwood and sapwood pulps from the very young, very rapid-growth wood showed the heartwood to have a slightly higher value at 800 cc freeness, but the same value for both pulps at 550 cc freeness.

The general trend was toward lower tearing strengths for the heartwood pulps; while trends shown by the tensile strength data confirmed the superiority of the heartwood pulps displayed by the bursting strength data.

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[2]Senior Engineer, Forest Products Laboratory, Madison, Wis.

Lignin Investigations

Reactions of Lignin with Hydrogen

ELWIN E. HARRIS[1] and HOMER ADKINS[2]

Soluble lignin (lignin isolated by methanol and hydrochloric acid, alkali lignin, and sulphuric acid lignin) was converted into a mixture of colorless products when it was heated with hydrogen under pressure in the presence of copper chromium oxide. One mole of hydrogen was taken up for each 25 to 35 grams of lignin used, depending on the type of lignin and the method of isolation. The reaction took place in dioxane solution at 250 to 260 degrees C. under 150 to 250 atmospheres of hydrogen during a period of 18 to 24 hours.

Lignin was converted by this reaction into methanol, a fraction boiling at 70 to 129 degrees C. at 1 mm. and a residue boiling above 130 degrees at 1 mm.

The fraction boiling at 70 to 129 degrees was fractionated into three derivatives of propylcyclohexane, namely, an alcohol boiling at 69 to 70 degrees at 1 mm., a glycol boiling at 107 to 110 degrees at 1 mm., and a glycol boiling at 125 to 129 degrees at 1 mm. Amounts of these fractions were found to vary, depending on the source of the lignin and the manner of isolation.

The material boiling above 130 degrees C. at 1 mm. was a mixture of colorless compounds having the general formula $(C_6H_{11}O)_n$. The residue from the hydrogenation of hardwood lignins contained no methoxyl; that from white spruce contained 10.0 per cent methoxyl.

The products boiling above 130 degrees C. at 1 mm. were dehydrated by heating at 430 degrees over alumina deposited on Italian pumace and then hydrogenated over Raney nickel. A mixture of a hydrocarbon and an alcohol were obtained that boiled at 80 to 140 degrees at 1 mm.

A preliminary investigation of the properties of hydrogenation revealed that the alcohol which boiled at 69 to 70 degrees at 1 mm. was a good solvent for lignin resins, and oils, that it was insoluble in water; that it was a very good plasticizer for lignin plastics; and that it was a preservative of about the same value as creosote against wood-destroying organisms. The two glycols were very viscous and had the property of delaying the evaporation of low-boiling organic solvents. The high boiling residue was insoluble in water and melted high enough to be satisfactory for use in bonding plywood.

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Sulphite Pulping of Douglas Fir

E. B. BROOKBANK, Jr.[1]

Since it has been estimated that the amount of Douglas fir slabwood cut per annum is equal to about 2,000,000 tons of pulp, and since this slabwood is from 90 to 95 per cent sapwood, successful pulping of this waste would open up a new source of raw material to Pacific Coast pulp mills. The sample of wood used contained 17 growth rings per inch in the heartwood and 38.5 in the hardwood. The sapwood constituted 15 per cent by volume and 20 per cent by weight of the entire log.

The sulphite cooking liquor contained 1.23 per cent combined and 6 per cent free

[1]Institute of Paper Chemistry, Appleton, Wis.

$2986 SAVED IN PUMPING COSTS!

City of Ionia, Michigan, Cuts Pumping Costs 55% by Switching from Old Pumps to Allis-Chalmers!

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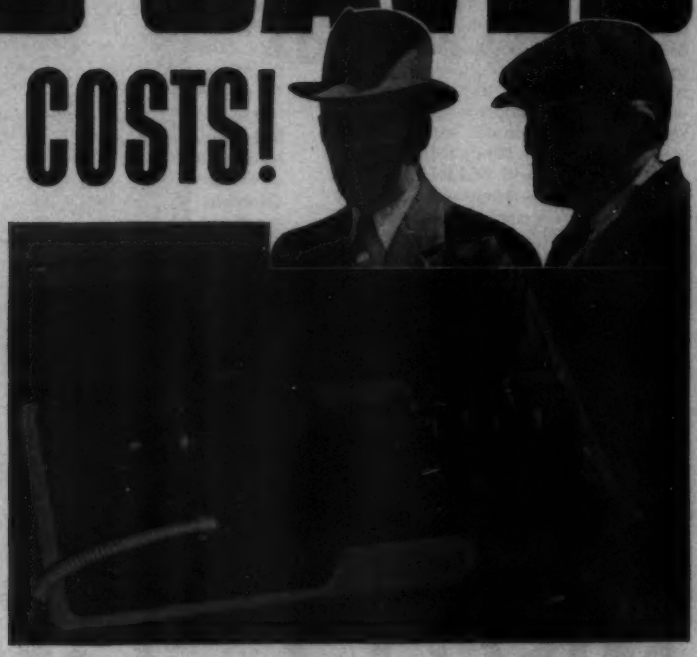

CITY ENGINEER LAURENCE HALE AND GUY EDINGTON, chief engineer of water works, accomplish a 55% cut in pumping costs with three Allis-Chalmers motor-driven centrifugal pumps. Shown above is a 4" x 3" SGH pump, rated 400 gpm at 110 ft head. Total maintenance cost for all the pumps—less than $6 a year for lubrication!

The City of Ionia, Michigan, knew that money could be saved by replacing the old pumps in their water works with Allis-Chalmers Centrifugal Pumps. But City Engineer Laurence Hale never expected a saving in pumping costs of 55%!

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sulphur dioxide. The liquor ratio used was 7 to 1. Cooking conditions were selected so as to keep the action as mild as possible and to allow a fairly long period at moderate temperatures for penetration and sulphonation before raising the temperature to the maximum value. It was found that sapwood and a mixture of 85 per cent sapwood and 15 per cent heartwood by weight (representative of slabwood) could be pulped in ten hours at 140-145° C. Because of their unusual physical properties, the application of Douglas fir pulp offers some interesting possibilities. The high tear and low apparent density indicate their use in building properties into a sheet which are not attainable with the pulps now on the market. While the color of the unbleached pulps will probably limit their use to those grades where color is not important, such as wrapping and deeply dyed cover stock, the bleached pulps might well be applied to such grades as toweling, bond, printing, mimeo, and various specialties. The unusual chemical properties of high alpha-cellulose and low pentosans suggest the application of these pulps to the manufacture of cellulose derivatives. The chemical data indicate that the purification of these pulps would be less expensive than that of pulps lower in alpha-cellulose.

An Investigation of the Flocculation of Papermaking Fibers

J. C. WOLLWAGE[1]

As an introduction to a study of the phenomenon of fiber flocculation and its effect on the various problems of fiber dispersion encountered in pulp and paper mills, a flocculation tester was developed which enabled observation of the various effects as the stock suspension flowed through a long glass tube. Results were obtained by visual and by photographic means. Possible factors affecting fiber flocculation which were studied by this technique included the effects of alum, temperature changes, beating and consistency and, to some extent, the addition of fillers and fiber dispersing agents such as bentonite clay and karaya gum.

The addition of 100 per cent alum, which had only a small effect on the *p*H of the white water, produced a marked dispersion of the fibers in tap water. Any increase in dispersion due to the addition of alum quantities greater than 100 per cent was relatively small. From studies in distilled water, it became evident that the dispersing effect of the alum was due to the formation of aluminum hydroxide or alumina. Changes in temperature of the fiber suspensions gave results which showed that the higher the temperature, the more marked is the flocculation; this is probably related to the decrease in the viscosity of the white water at the higher temperature. Bentonite clay causes an increase in flocculation, which would suggest that the hydrous gelatinous nature of the bentonite flock affected a simple mechanical agglomeration of the fibers. The effect of consistency is quite marked and may be a direct statistical result: The greater the number of fibers in suspension, the greater the number of fiber collisions and, hence, the increased flocculation with higher consistencies. However, flocculation does not appear to increase in linear proportion with consistency. Neither hydration of the fibers obtained by pebble milling nor a sharper cutting action obtained in a laboratory beater decreased flocculation tendencies of an unbleached sulphite pulp; if anything, flocculation was slightly increased.

[1]Institute of Paper Chemistry, Appleton, Wis.

Fundamental Study of the Removal of the Constituents of Wood in the Alkaline Cooking Process

F. E. BRAUNS[1] and W. S. GRIMES[2]

A series of some 20 cooks of spruce wood has been made with varying amounts of sodium hydroxide and the pulps and waste liquors analyzed for their lignin contents; the material recovered from the black liquor by precipitation with acid was also studied. The data show, in agreement with earlier work, that the carbohydrate materials dissolve more rapidly than the lignin in the early stages of the cook; then follows a simultaneous dissolution of carbohydrate material and lignin; while in the later stages of the cook, when nearly

[1] and [2] Institute of Paper Chemistry, Appleton, Wis.

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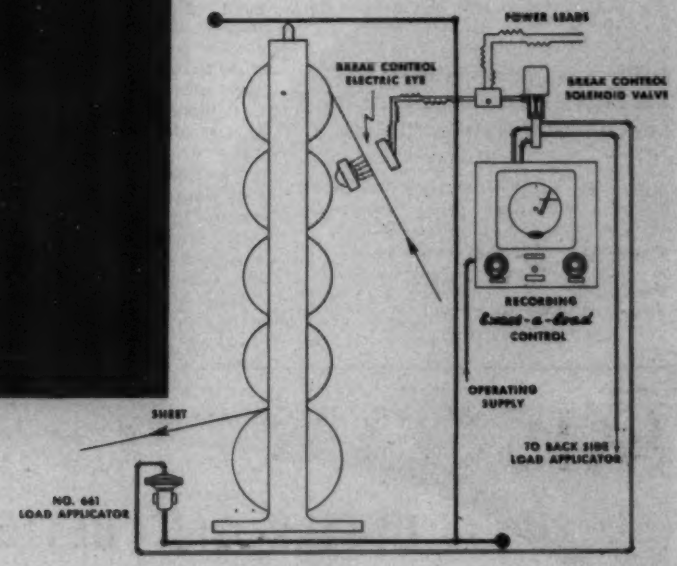

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all of the pentosans and hemicelluloses have been dissolved, more lignin goes into solution. A two-stage cook was also studied; the results showed clearly that no resinification of the lignin and that a normal pulp can be obtained by such a process. Preliminary hydrolysis of the wood with 1 per cent sulphuric acid considerably decreased the pulp yield. For a normal one-stage soda cook, the alkali consumption is about 16 per cent; of this, approximately 1.5 per cent is consumed by the formyl and acetyl groups present in the wood; 3 to 4 per cent are required for the solution of the lignin; a portion of the remaining alkali is retained by the pulp through absorption, while the major portion is used for the dissolution of the carbohydrates, a part of which is undoubtedly transformed into acidic products. In a two-stage cook, the alkali consumption (18.6 per cent) is somewhat higher, due in part to absorption by the pulp.

Influence of Humidity on Changes in Diameter and Length of Sulphite Fibers

J. P. WEIDNER[1]

By means of a constant humidity apparatus and a microscopic cell, the changes in fiber dimensions of individual wood pulp fibers have been studied over a cycle of 95 to 0 and 0 to 95 per cent relative humidity. Some of the results of the study are: Fiber dimensions are definitely dependent on the relative humidity of the surrounding air. The dimensions of fibers in water and at equilibrium are not appreciably different. Hysteresis in fiber widths exists for the pulps studied; after the original desorption, hysteresis in fiber widths persists unchanged in the range of 0 to 95 per cent relative humidity.

Pulps cooked for 9.5 and 10 hours have average fiber diameters of approximately the same magnitude, but pulp cooked for 11 hours has a significantly larger average width at all humidities. Prolonged drying of the fibers at 103° C. decreased the swelling of the fiber on adsorption by 50 per cent. Beating to a freeness of 650 decreased the total swelling on adsorption by 25 per cent; about the same result was observed on bleaching with 8 per cent hypochlorite. If the ratio of the total per cent change in width on adsorption of the unbleached pulps to the change in the treated pulps is taken as a measure of the relative effect of the treatment, the differences in the treatments are: beating to 650 freeness, ratio 1.25; bleaching with 8 per cent hypochlorite, 1.30; drying at high temperature (103° C.), 2.16.

The behavior of handsheets made from these pulps was also studied. The unbeaten sheets showed 1.8-2.2 per cent and the beaten sheets 3.2-4.4 per cent total change on drying. The ration of the change in fiber width to length was of the same order of magnitude as the ratio of the changes in machine-made papers.

[1]Institute of Paper Chemistry, Appleton, Wis.

An Investigation of the Optical Scattering and Absorption Coefficients of Dyed Handsheets and the Application of the I. C. I. System of Color Specification to These Handsheets

W. J. FOOTE[1]

The reflectance curves of dyed sheets as determined by a spectrophotometer are of value for at least four reasons: (1) They evaluate a fundamental sheet value. (2) If two sheets have the same spectral reflectance curves, they will match physically under any kind of illumination. (3) The curves may be used roughly to identify the dyes used in coloring the sheets. (4) The curves form a basis for making an estimate of the amount of dye necessary for matching an unknown sheet.

After a discussion of tristimulus values, trichromatic coefficients, visual efficiency, dominant wavelength and excitation purity, it is shown how these may be used for the formulation of the specifications of dyed handsheets through the use of color-mixture diagrams, and further how such diagrams may be used in color matching. Discussion brought out the fact that, while the work presented in this paper seems to be of a highly theoretical nature and scarcely applicable to mill control of the manufac-

[1]Institute of Paper Chemistry, Appleton, Wis.

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ture of colored papers, at least one mill is using the spectrophotometer as a means of matching colors and as the final check of the color of a dyed sheet.

Data on Heat Exchanger Performance

H. A. DUBOIS[1] and B. F. SMITH[2]

Coolers for sulphite mill use may be grouped in three general types: (1) exchange of sensible heat between two liquids with forced convection in both sides of the apparatus and counter current flow (coolers of this type having been constructed for cooling the circulating waters for spray gas coolers for cooling sulphite relief liquors and for cooling calcium hypochlorate bleach solutions); (2) condensing vapor in the presence of a non-condensable gas such as the cooling of digester relief gases; and (3) gas coolers with forced convection inside the tubes and natural convection outside as is the case in the conventional pond type burner gas cooler.

Actual tests of the performance of four new heat exchangers (liquor cooler at Kimberly, Wis.; bleach liquor cooler at Niagara, Wis.; interprocess cooler at Niagara, Wis.; and heat exchanger for spray type burner for gas cooler) transferring sensible heat between two fluids have been carried out recently. Liquid flow rates were determined by means of sharp edged orifices with mercury manometers for measurement of the differential pressure. Iron-constructed thermocouples and a Leeds and Northrup indicating potentiometer for normal temperature range were used for the temperature measurements except in the case of the bleach liquor cooler in which case mercury-in-glass thermometers were used and calibrated in the range of the tests.

Following is a summary of results calculated from the average of 23 sets of observations in connection with the liquor cooler (part of a SO_2 concentrating system where it serves to cool a liquor containing some 0.54 per cent SO_2):

Liquor Cooler

Liquor temperature °F Entering 173.73
Liquor temperature °F Leaving 89.64
Water temperature °F Entering 77.7
Water temperature °F Leaving 112.7
Average B.t.u. per hour = 1,003,800
Liquor velocity (ft. per sec.) = 3.88
Water velocity (ft. per sec.) = 4.33
Theoretical coefficient (C_t) = 298
Actual coefficient (B.t.u./Hr/Ft²/°F) = 289

$$\frac{C_t}{C_a} = \text{Ratio} = 1.03$$

This is believed to be satisfactory for ordinary sulphite work since the data regarding flow rates and temperatures will tend to vary over a wider range and a safety factor of some 15% should be applied in any event.

Twenty-two sets of data were taken and thirteen stable sets were averaged and used in the calculations involving the bleach liquor cooler. The rate of exchange varied from one of 733,000 B.t.u. per hour during the gassing operation to one of 350,000 B.t.u. per hour obtained just before the start of the gassing operation. Liquor velocities approximated 13 feet per second and water velocity was 4.2 feet per second in both periods.

The interprocess cooler was provided to enable use of river water in place of well water formerly used during summer months for preparation of bisulphite acid in a Paulson milk-of-lime acid tower. The scheme is to withdraw the liquor from the tower at a point where the bisulphite formation has ceased, to pump it through a cooler, and to deliver it to the final stage of the acid absorption system for fortification with "free SO_2."

Twenty-five sets of observations were taken at two minute intervals in one series and twenty sets in another. A summary of the test results is given in the following table:

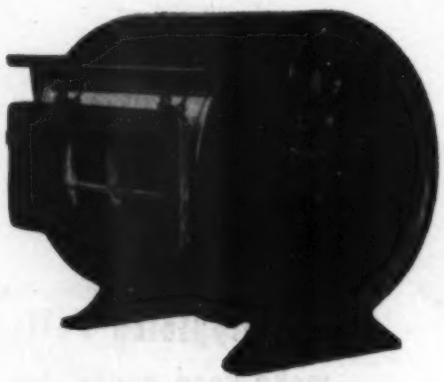
Interprocess Cooler

	Series I	Series II
Liquor temp. (°F) Entering	99.2	94.5
Liquor temp. (°F) Leaving	80.8	73.9
Water temp. (°F) Entering	69.1	64.4
Water temp. (°F) Leaving	86.5	80.7
B.t.u. per hour	1,000,000	1,332,000
Velocity liquor (ft./sec.)	4.27	5.07
Velocity water (ft./sec.)	1.92	2.72
Theoretical coefficient (C_t)	222	246
Actual coefficient (C_a)	202	282
Ratio $\frac{C_t}{C_a}$	1.1	0.87

Twelve thermometer wells were provided

[1]Sulphite Staff, Kimberly-Clark Corp., Neenah, Wis.

[2]Process Engineer, Kimberly-Clark Corp., Neenah, Wis.



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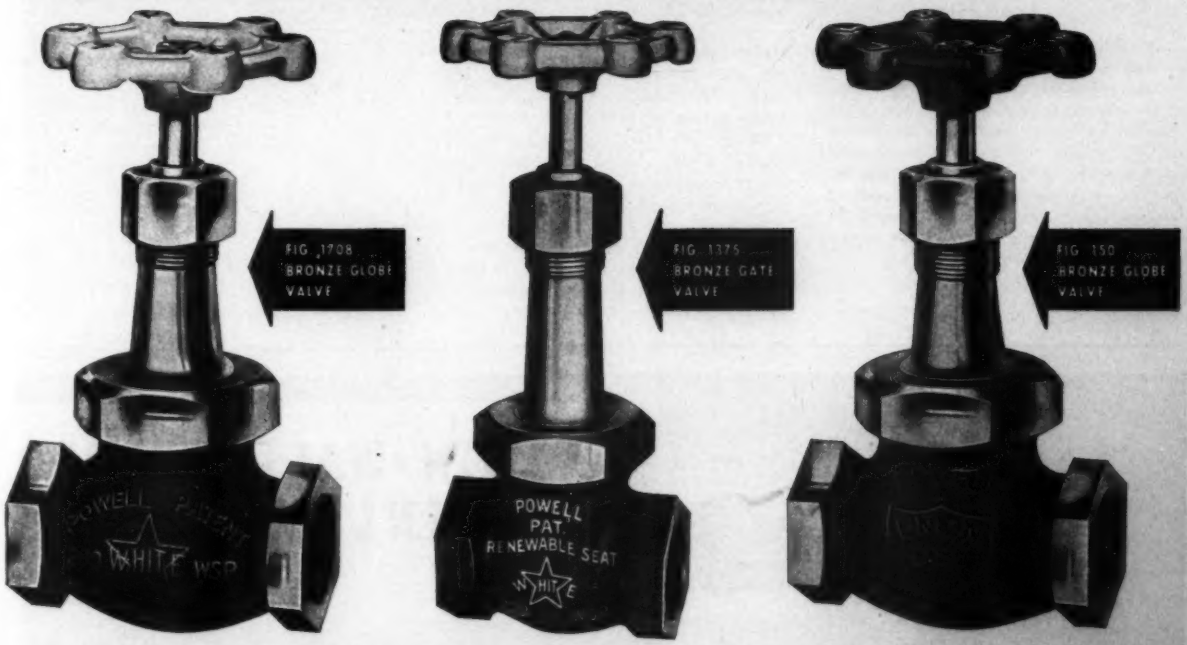

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in the return bends and water connectors of the heat exchanger for spray type burner gas cooler to allow tests of various portions of the cooler. Flow rates were measured in the hot liquor line entering the cooler. Some 325 separate observations were made, and 143 stable consecutive portions of the data were averaged separately to give values shown in the following table.

Gas Cooler Heat Exchanger
(Twenty Passes)

	Series I	Series II
Liquor temp. (°F) Enter.	123.8	129.2
Liquor temp. (°F) Leave.	103.0	107.8
Water temp. (°F) Entering	92.0	96.6
Water temp. (°F) Leave:	112.0	116.95
B.t.u. per hour	1,277,000	1,306,000
Velocity (ft./sec.) Liquor	6.68	6.62
Velocity (ft./sec.) Water	3.26	3.27
Theoretical coefficient (C_t)	319	324
Actual coefficient (C_a)	257	252
Ratio $\frac{C_t}{C_a}$	1.24	1.28

Similar calculations were made for portions of the cooler.

Methods and references for calculation of similar data in connection with digester relief coolers are given in Chapter IX, *Heat Transmission* by McAdams; while a detailed calculation for a conventional pond type burner gas cooler is given on page 148 of *Principles of Chemical Engineering* by Walker, Lewis and McAdams.

Economics of High Pressure Steam for Paper Mill Power Plants

A. KOLFLAT[1]

Developments in the paper industry are intimately interrelated with the generation of mechanical and electrical power. Most of the older paper mill boiler rooms are operated with steam pressures between 100 and 150 pounds per square inch and without superheat, so that the steam temperature approximates 360 degrees F. In the last few years, a number of mills have installed power plants designed for higher steam pressures of 450 to 650 lb. per square inch and for total steam temperatures up to 725 degrees F.

There is no definite demarcation between low and high pressure steam, as the terms vary with different types of industry, and as far as boiler pressures are concerned, the term, "high pressure," is used more to signify pressures beyond what has been previously established as usual for the industry or the particular plant.

When steam is for generation of power alone and where there are no requirements for process steam, approximately one-third of the heat in the steam can be converted into power and the remaining two-thirds of the heat in the steam is lost to the circulating water in the condensers. When, on the other hand, steam is generated not only for the purpose of making power, but also to supply process and heating steam, then most of the heat which otherwise would be discharged to the condenser can be used in the process, the steam turbine or engine acting somewhat as a pressure reducing valve and abstracting an amount of heat from the steam equivalent to the power produced, the remainder of the heat in the steam being partly or entirely used in the process.

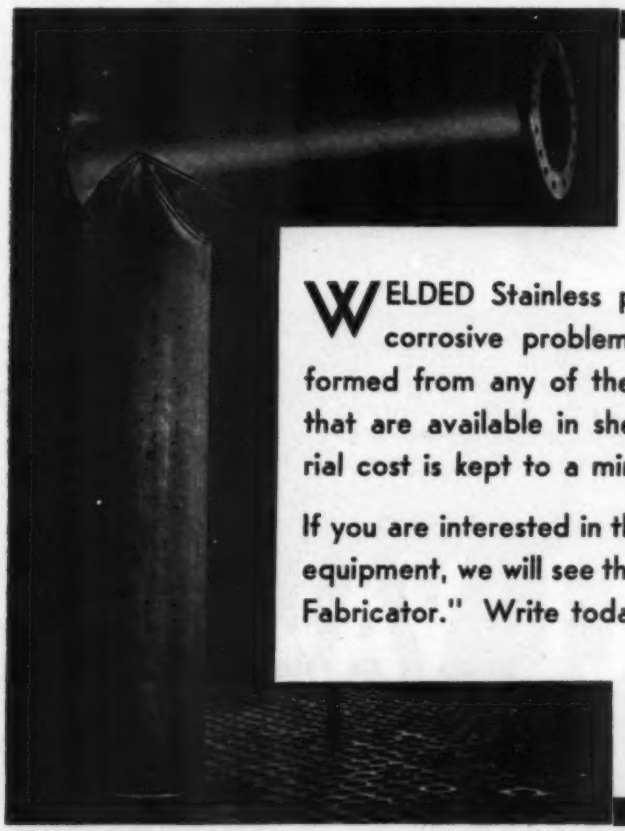
In very few cases are the ratios between power and process steam such that all of the power required can be made as "by-product" power. Part of it usually has to be made condensing.

High steam pressures are economical for "by-product power" generation, because the higher the pressure, the larger the proportion of "by-product power" in relation to the portion which has to be made condensing with consequent reduction in fuel cost for the combined power.

Full advantage of increase in steam pressure is not obtained unless the steam temperature is increased simultaneously with the pressure. There is a definite reason for the use of 150-pound pressure and 450 degree steam temperature as an "anchor point." Most of the paper mills have a steam distribution piping system with cast iron fittings and valves and this material should not continually be subjected to temperatures above this limit. The selection of this temperature-pressure relationship also is well suited to the different processes involved.

(Continued on page 682)

[1]Mechanical Engineer, Sargent & Lundy, Chicago, Ill.



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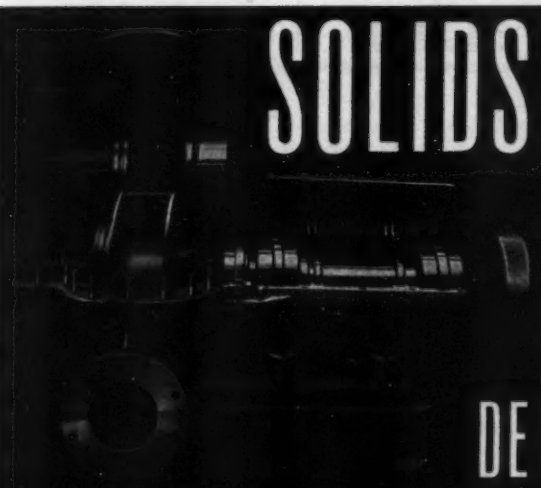

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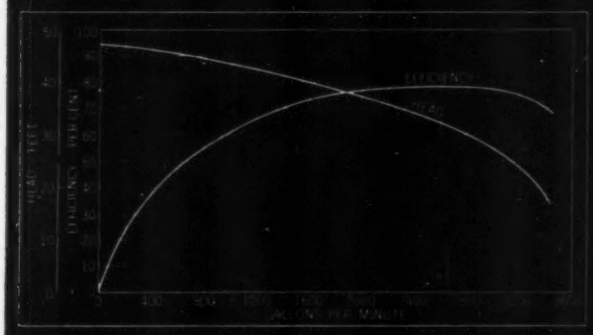
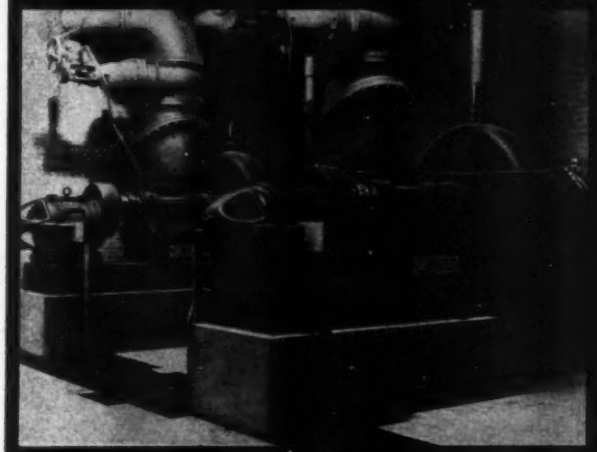


Head–delivery and efficiency characteristics of a De Laval Clogless Pump at 500 r.p.m.



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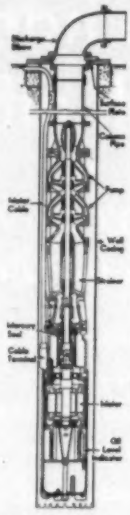


Two New Colors

A new basic color, developed particularly for spirit printing, has been announced by the Dyestuffs Division, E. I. du Pont de Nemours & Company, Wilmington, Delaware. This color, designated as du Pont Auramine SP Concentrated, is designed for use where straight basic colors are employed in preference to Rotalin colors for spirit printing and where fastness to water bleeding is not a factor. The new color is equal in strength and shade to du Pont Auramine Concentrated, but is much more soluble in alcohol.

The second new color, another addition to the current range of du Pont spirit printing color, was developed in response to a demand for a bluer shade of red. The new color, known as Rotalin Red Extra Concentrated, produces a shade of red similar to that obtained with du Pont Rhodamine B Extra, and is considerably bluer than Rotalin Brilliant Red B and Rotalin Red Y. It is similar in properties to the other Rotalin colors and may be handled in the same manner in the preparation of spirit printing inks.

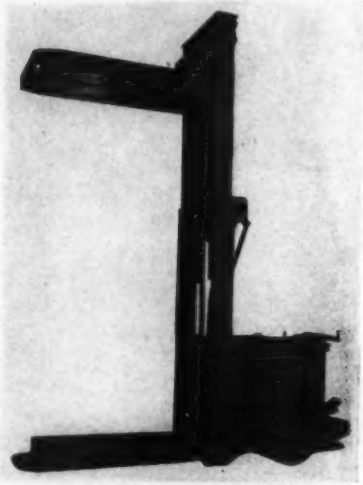
Forehead Sweat Pad

A forehead sweat pad, designated as Drybrow, has been announced by the American Allsafe Company, Inc., 210 Franklin Street, Buffalo, N. Y. The pad is made of du Pont cellulose sponge, which should be

dipped in cool water and squeezed before application, and a one-piece latex head band. The manufacturer suggests that the pad can be easily sterilized by boiling or steaming; and states that use of the pad promotes clear vision, relieves heat fatigue, and prevents accidents.

Telescopic High Lift Platform Truck

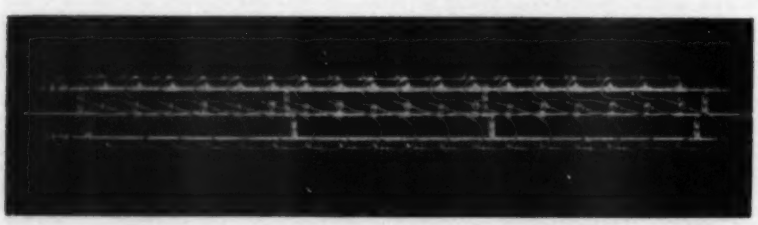
A telescope high lift platform truck of 5-ton capacity has been developed by the Automatic Transportation Company, 101 West Eighty-Seventh Street, Chicago, Ill. This truck was designed with a lifting height of 14 feet when telescopic uprights are fully extended, and a lift of 91 inches when the uprights are collapsed to 119 inches. The platform is 36 inches wide, 72 inches long, and 11 inches high in low position for skid entry. Main frame members supporting load wheels and telescopic uprights are deep sectioned solid steel plate, formed to provide a box frame around load axle. Solid alloy steel bars, machined in channel form and heat treated, are used for the telescopic uprights and main fixed uprights. The stationary members, housed in chassis and cross braced, are hot riveted and welded to an alloy steel main bed casting to which is connected the rear part of the chassis supporting the drive axle, battery compartment, and operator's control platform. The hoisting mechanism comprises a triple spur gear reduction transmission unit powered by a heavy duty, entirely enclosed motor. This unit operates two double strand alloy steel roller chains. These chains operate a series of sprockets to provide complete telescopic platform lift. Chain adjustment is provided on platform for slack take-up due to chain stretch. Full safety limit switches provide maximum travel range of platform up and down. The



drive unit is a combination bevel and spur gear transmission unit with full floating drive shafts and Automatic "V" type universal driving joints. Drive wheels have wider tread than standard models. Helical coil springs, two to each side of truck, support entire rear part of chassis. The load axle is a 4-wheel assembly. Steering knuckles are center pivoted on the wheels; and all rods and steering connections are well up within the frame. Other standard features incorporated in the truck are: Rotor-Brush Power Flow with built-in dynamic brake for drive unit, rubber covered foot pedals, heavy steel bumper plate at rear, well ventilated compartment for battery which is accessible either through top or sides, and high pressure lubricating system.

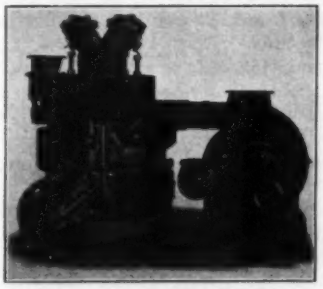
Sheet Moistener

A new sheet moistening unit has been announced by the Spray Engineering Co., 169 Central Street, Somerville, Mass. The quality and volume of spray produced by this unit can be adjusted within close limits. Unusually high degree of atomization is claimed for its compressed air operated spray heads, which are adjusted to provide uniform distribution over entire width of sheet. The unit is built to order for any width sheet or for special requirements.



Coal Pulverizer

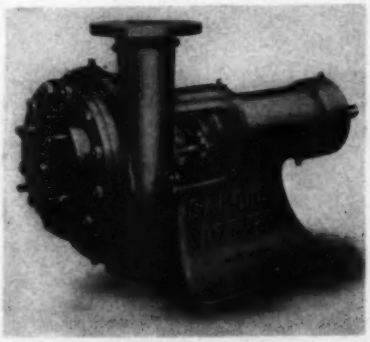
A coal pulverizer, known as the B & W Type E pulverizer, has been developed by The Babcock & Wilcox Company, 85 Liberty Street, New York, N. Y. In this pulverizer, coal is pulverized by a single row of large-size balls between a stationary top ring and a rotating bottom ring which is driven from the base of the mill. Raw coal is fed to the inside of the upper grinding ring, and, aided by centrifugal force, passes outward between the grinding balls. Preheated air, passing upward between the



grinding elements and the housing, picks up the ground coal particles, drys them, and carries them to a rotating classifier in the top of the pulverier. Overzsize particles are returned from the classifier to the grinding zone for further reduction. Fineness of coal delivered is regulated by the air flow through the mill. Capacities of the sizes now designed are from 2.0 to 13 tons per hour. Power consumption as low as 9 kw-hr, per ton of Pittsburgh seam coal, pulverized to pass 65 per cent through 200 mesh, is reported by the manufacturer.

Non-Clogging Centrifugal Pumps

Two non-clogging centrifugal pumps have been announced by the Gardner-Denver Company, Quincy, Illinois. One of these pumps is designated at Type "J"; the other, as Type "K". Both designs are identical in mechanical construction except that



the frame of the Type "J" pump has a foot cast integral with it, while the foot or base of the Type "K" pump is bolted on the suction side of the volute. Each design of pump has a two-bladed impeller of the side suction enclosed type; a casing with discharge nozzle that can be placed in any one of eight positions and which with proper impeller, can be used for either a right or left hand pump; a stuffing box, a separate casting bolted to casing, for receiving a minimum of six rings of packing; and a water seal ring with tapped opening for connection to clear water. Other features of the designs include grease lubricated ball bearings contained in dust and splash-proof housings, and disc or flat type renewable double wearing rings on impeller and front head.

Protective Coatings

X-pando Corporation, 43-15 Thirty-Sixth Street, Long Island City, New York, N. Y., has announced a line of protective coatings for solving painting problems peculiar to the pulp and paper industry. These coatings, according to the manufacturer, are highly resistant to acid and fume conditions and are very successful in application to beaters. The manufacturer also states that they can be applied to any surface, including metal or wood, that has been cleaned thoroughly of all loose particles; and that they produce a smooth finished surface with no "lift." The base for these coatings is made from fused fossil gums rather than linseed oil. The line, known as Manotox, includes three products, one a transparent waterproofing designated as X-Pandoseal Formula "B," and the other two as F-68 and B-92 respectively. F-68 is supplied in white, black, gray, green and red colors; while B-92 comes in brown only.

Batch Screen

Ajax Flexible Coupling Co., Westfield, N. Y., has announced a small batch screen for the sifting of dry materials. The screen has an over-all length of 36 in., a width of 18 in., and a height of 15 in. It is of single deck design with a cloth area of 12

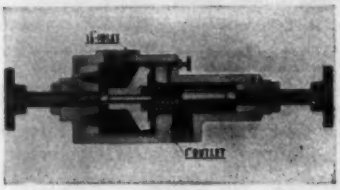
in. by 24 in. It also is totally enclosed and dust tight, with feed and discharge spouts arranged for boots. The screen, operated through a 1/12 hp. motor that is connected through a V-belt drive to an Ajax-Shaler Shaker unit size 3B, is suggested by the manufacturer for short runs, test work, or low tonnage jobs.

Rubber Covered Table Roll

The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J. has introduced a rubber covered table roll, the covering of which is of a distinctive red mottled composition manufactured exclusively by Manhattan and designated as Marblex. This product is claimed to be particularly suited for table roll covering because of its great resistance to abrasion, acid conditions, and cracking. The smooth surface of a Marblex table roll is said to dispel water as the roll travels downward. It likewise is claimed that the surface of such a roll may be turned down, when necessary, with little loss of rubber; and that longer wire life is assured by the use of such rolls because of the elimination of galvanic action.

Automatic Shut-Off Valve

An automatic shut-off valve, for installation in a supply line ahead of a flexible hose used to convey compressed air, steam, gas, or fluids under pressure, is being



manufactured by D. J. Murray Manufacturing Co., Wausau, Wisconsin. The valve, sold under the trade name of "Murray-Lorge," is designed to automatically shut off the supply when a break in the hose occurs or should it become disconnected.

Coating Pigment

Heller & Merz, 90 West Street, New York, N. Y., has announced the addition of a new dye, known as Fast Pigment Yellow R Paste, to its line of coating pigments. The manufacturers state that this product has excellent fastness to light and acid; that it mixes readily and gives very smooth and even coatings in light, medium and full tones; and recommends it for plain and glazed coatings when smoothness of finished product is essential.

Face Mask

Industrial Products Company, 809 W. Somerset Street, Philadelphia, Pa., has announced a face mask which has been designed to offer protection to the eyes, face and neck from acid splashes and other chemical hazards. Its frame is of sheet aluminum, formed to shape and channeled to allow for a clear cellulose acetate win-

dow of approximately 7 in. by 9 in. in size. This window may be replaced without the use of tools. Special black vulcanized fiber is used for the headgear which is form fitting and adjustable to various head sizes. Friction hinge joints permit the wearer of the mask to raise it over the head when not exposed to a hazard. The mask, weighing only about 14 ounces, may be worn with or without correction glasses.

ALLIED

NEW EXPANSIONS AT F-B COMPANY

Construction of additional foundry building space has recently begun at the Ansonia (Connecticut) plant of Farrel-Birmingham Company, Inc. The new building will add 4,000 square feet of floor area as part of a program of rearrangement of the Ansonia foundry department for increased efficiency and output.

Included in the new equipment to be installed is a 15-ton traveling crane, a large molding machine, and a modern sand handling system for the elimination of dust and for reclaiming sand from molds used in the Randupson process.

The new construction and rearrangement will be completed by December. It is expected to provide not only improved facilities for greater efficiency and larger output, but also to decrease congestion and improve working conditions.

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COAL CONSUMERS URGED TO BUY BEFORE WINTER

Consumers and dealers of domestic sizes of bituminous coal are urged to purchase at least part of their winter requirements before the burning season starts, in a statement issued recently by John Carson, Consumers' Counsel, National Bituminous Coal Commission.

"While stocks of industrial coal on hand this year," Mr. Carson pointed out, "are considerably less than last year, there is no certainty that the demand for screenings and small sizes used for industrial purposes during the winter will balance the demand for domestic sizes."

◆

DEVELOP NEW TYPE LACQUER AT DU PONT

E. I. du Pont de Nemours & Company has recently developed a new paper lacquer which is moisture-proof. Designed primarily for use on packages, the new lacquer affords a protective film which is impermeable to water vapor. Its purpose is to prevent moisture from entering into packaged goods which should be kept dry and, similarly, to retain the desired quantity of moisture in those which should be moist.

The new lacquer is said to prevent off-setting and smearing of inks on labels of products which must be packaged while hot. It is resistant to scuffing and scratching and can be made to resist alcohol, greases and other reagents.

◆

CENTRIFUGAL PULP SCREEN ON PAPER MACHINE

An interesting installation of a centrifugal pulp screen has been reported by the Trimbey Machine Works, Glens Falls, N. Y. The screen, a small Senior Trimbey, equipped with screen plates with .065 inch round hole perforations, has been installed on a paper machine as a supplement to the machine's previous screening installation, consisting of two rotary screens and a flat, reject screen. Ordinarily, the paper machine, which is equipped with a short wire, is on a light sheet of a good grade and the supplemental screening capacity is not necessary. For about three to four days each month, however, it has to run on a 95 pound sheet of a furnish of approximately 70 per cent ground wood and 30 per cent sulphite with no filler. In this latter case, maximum tonnage which the dryers are capable of drying cannot be supplied by the previous screening installation. The necessarily high consistency of stock that has to be furnished prevents it even though plates with .045 inch slots are substituted for plates with slots of about .012 inch to .014 inch, as was the practice in the past. It is to meet this condition that the Trimbey screen was installed.

The Trimbey screen, installed to permit by-passing and to permit gravity flow of rejects to the customary flat

Thirty-four G-E motors, coupled to E. D. Jones Majestic jordans in the kraft paper mill of the Union Bag and Paper Corporation, Savannah, Georgia. The motors total 11,900 hp. and make up the largest single installation of such motors in the paper industry. Each motor has the following characteristics: 350 hp., 0.8 p.f., 400 rpm., 2,200 volts, 60 cycles.

One Paper Mill Customer expresses his appreciation—

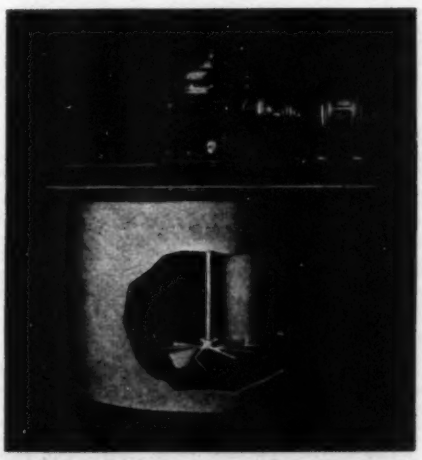
"We know when we are well served and will not hesitate to call upon you again when we require equipment in your line."

"New England" Agitating Equipment—built to serve well—is definitely modern in design and able to do 3 things:

1. Produce more uniform mix;
2. Do it more quickly; and
3. Reduce Agitator maintenance to a minimum.

The one thing remaining is for you to let us match our equipment against your needs for stuff chests and other agitating equipment — remembering that with "New England" is included the *judgment* of Engineers who have made agitation their own specialty.

Catalog 380 contains complete information—address:



NEW ENGLAND TANK & TOWER CO.
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CLEANER PAPER

AT LOWER COST WITH

ARMCO STAINLESS

When pulp and paper come through stained and discolored from impurities such as rust, the results are not what your care and skill deserve. One good way to help correct this is to use equipment made of Armco Stainless Steel. Then you are assured of a clean product and lower maintenance costs.

Chemicals used in pulp and paper production have little or no effect on Armco Stainless Steel. It is strong and abrasion-resistant. Short metal life and paper stock damage caused by corrosion can now be things of the past.

Let Armco Stainless aid you in producing better paper. There is a correct grade for every pulp and paper mill requirement. We'll help you select and apply it—or just specify "Armco Stainless Steel" to your equipment fabricator. The American Rolling Mill Company, 2951 Curtis Street, Middletown, Ohio.

ARMCO

STAINLESS STEELS

screen and the return of accepted stock for rescreening, operates with the plates fully submerged. At the time the screen was first placed in operation, the change over was made "on the fly" without breaking the sheet and for the next thirty hours the sheet never left the calender stack; and, in addition, the screen handled all of the stock for the paper machine which was making better than 50 tons of finished paper per day.

A larger size screen of the same design and having approximately twice the effective plate area is now being built. It is expected by the manufacturer that this screen will handle easily a paper machine of 80 to 90 tons per day capacity.

◆

WESTINGHOUSE MAKES CHANGES IN DEPARTMENT

The Westinghouse Electric and Manufacturing Company is reorganizing its air conditioning department which will now be located at the East Springfield (Mass.) plant of the company. P. Y. Danley has been named manager of the department and S. F. Myers has been appointed assistant manager.

The new department will function as a separate organization and will not be directly associated with the present Merchandising Division as it has been in the past.

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ARMCO OPENS NEW DISTRICT OFFICE

The American Rolling Mill Company recently opened a new district sales office in Minneapolis, with W. A. Danner, formerly connected with the Chicago office, as manager. Mr. Danner, who has been associated with Armco for the past 16 years, will be assisted by S. A. Yaeger, who was also formerly associated with the Chicago office of the company.

◆

APPARATUS ASS'N TO RUN CONTEST

The Industrial Instrument Section of the Scientific Apparatus Makers of America has recently announced an instrumentation contest with a first prize of $200.00. Twelve prizes in all will be awarded by the Apparatus Makers.

The contest is open to any engineer or operating man not employed by an instrument manufacturer. Each contestant is to write about an unusual application of a standard instrument or control device telling briefly what conditions or need impelled the application. The association is located in Chicago.

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J. R. BOOTH CO. BUYS HYDRAFINERS

The J. R. Booth Company of Ottawa, Canada, has just purchased two hydrafiners from the Dilts Machine Works, Inc., Fulton, N. Y. It is understood that these units are to be put into operation at the Ottawa mill to work in conjunction with the present system. The Booth Company is using the new Hydrafiners to supplement its present beater system. It is expected that a substantial reduction in power costs, together with increased quality of the pulp and efficiency of operation, will be effected.

New Catalogues and Publications

Acme Steel Co., Chicago, Ill.—An extremely attractive booklet regarding this company's product, Floorsteel, has been issued recently by the firm. The new, 12-page booklet describes and illustrates installations in both existing and new buildings and explains how the small, steel mesh, imbedded in the concrete or mastic, serves to cut down maintenance cost and reduce accidents. There are many interesting photographs contained within this release, as well as pertinent facts and data regarding the construction and usages of this product.

Bailey Meter Co., Cleveland, Ohio—An extremely interesting and attractive bulletin (No. 102-B) illustrating the construction and usage of the company's steam flow-airflow automatic readjustment type of air-operated combustion control, has been published recently. Covering 32 pages this new presentation explains fundamental principles involved in controls, both for boilers fired with stokers and for boilers fired with fuels in suspension. Several actual installations are shown diagrammatically and illustrated with installation photos.

Black-Clawson Co., Hamilton, Ohio—An interesting folder regarding the construction and design of the fourdrinier machines built by this company has been released lately.

Elwell-Parker Electric Co., Cleveland, Ohio—Elwell-Parker's newest addition to its technical bulletin file describes the company's E-1 telescoping platform truck. Specifications and illustrations of the product are given in this new bulletin (No. A-3330) which may be obtained on request to the company.

Fairbanks Co., New York, N. Y.—A new 20-page catalogue (No. 54) illustrating the various wheelbarrows, scrapers, etc., manufactured by this firm has recently been published. The catalogue contains many illustrations of the company's products and incorporates brief, descriptive written material and specification data relative to the latter.

Goulds Pumps, Inc., Seneca Falls, N. Y.—A new bulletin describing this company's new line of centrifugal pumps has been released lately. The bulletin gives a complete description and may be obtained upon request.

Lawrence Machine and Pump Corp., Lawrence, Mass.—This company has recently published a new bulletin (303-2) describing the acid and chemical pumps manufactured by the firm. The release covers fully the construction of this type pump and contains much of interest to engineers and superintendents who are concerned with the problem of pumping acids and other corrosive liquids.

Lunkenheimer Co., Cincinnati, Ohio—This company has recently issued a new 44-page list price schedule which supersedes all previously published list prices. It covers the entire line of valves, boiler mountings and lubricating devices which are listed numerically by figure number. These schedules are available through the company's distributors and from the company direct.

Metallizing Engineering Co., New York, N. Y.—Two interesting bulletins regarding Metallizing Process have been released lately by this company. One bulletin (P-10) contains illustrations and written material describing the process itself, showing its uses as to restoring original dimensions of worn parts, as a corrosion resistant and as a decorative coating. The other bulletin (37) describes the Metallizing gun, explaining its principles of construction and design.

Pennsylvania Salt Manufacturing Co., Philadelphia, Pa.—A very interesting and well-written bulletin entitled *Liquid Chlorine* has been published recently by this firm. Containing much of interest regarding the subject, this 32-page release (Data Book No. 2 5838) pays much attention to paper pulp chlorination, there being included an illustration showing the company's method of applying chlorine dispersions in pulp bleaching. The bulletin, bound in a shiny blue and yellow cover, contains many photographs and diagrams which serve to aid the written material in presenting the subject of liquid chlorine.

Swenson Evaporator Co., Harvey, Ill.—A new bulletin describing and illustrating the company's evaporators, filters and crystallizers has been issued lately by this firm. Included in the release are cross-sectional diagrams and photographs which, together with the well-written literature, give the reader a clear idea of the principles of construction and the usages of the company's products. Of special interest is the photograph on the cover of the bulletin showing the world's largest evaporator.

C. J. Tagliabue Mfg. Co., Brooklyn, N. Y.—A splendid new 64-page catalogue (No. 1060 D) has just been published by this company. In addition to the new line of recording thermometers and recording pressure gages, complete data is found on indicating and recording controllers in this recent issue. The release is replete with photographs and contains a wealth of data relative to the company's indicating, recording and controlling instruments. The literature is presented in a clear, understandable manner and this, together with the many charts, diagrams and illustrations, serve to give the reader a thoroughly complete idea of all points presented. The bulletin is bound in a semi-stiff blue and silver cover and would be a valuable addition to any industrial library.

OTHER COUNTRIES

AUSTRALIAN NEWS

A review of the developments of the Australian paper industry was recently published in the Department of Commerce publication, *World Machinery News.*

The item stated that during 1937 approximately 85,000 long tons of paper and paperboard were manufactured in Australia, all of which was made from imported pulp. However, the production of paper will be increased substantially and the manufacture of pulp will be undertaken for the first time when two new plants, now in the course of construction are finished and a projected plant for the manufacture of newsprint has been erected.

At present, said the item, the Australian Paper Manufacturers, Ltd., is the only company in Australia manufacturing paper. It is controlled by a holding company known as Australian Paper and Pulp Co., Ltd. The former concern owns four mills which have been in production for several years. One of these mills, located at Melbourne, has one board and one paper machine. Another mill, located 46 miles from Melbourne, is said to be the only strawboard mill in the British Empire and produces strawboard of all thicknesses. The third mill produces principally kraft wrapping papers. The fourth mill is located at Botony, near Sydney.

The company is now erecting a mill near Melbourne which is expected eventually to produce between 25,000 and 30,000 tons of wood pulp annually by the sulphite process. Australian Paper Manufacturers, Ltd., will, at first, use this pulp mill for its existing paper plants but the company also has plans for the erection of a high speed paper machine alongside the pulp plant with a capacity of 23,000 tons of paper annually. This machine is expected to be in operation at the end of 1939 or early in 1940. It will be used to supplement the company's present units manufacturing wrapping and similar types of paper.

The Associated Pulp and Paper Mills, Ltd., which was registered on April 18, 1936, has almost completed a plant at Burnie, Tasmania, where it will manufacture wood pulp by the soda process and fine printing, writing and typewriting paper. It is expected that this company will commence production before the end of 1938 and that the initial output will be 15,000 tons of paper annually.

The Australian Newsprint Mills Pty., Ltd., has been formed by a group of newspapers which, for a long time, have been interested in the possibility of producing newsprint in Australia. The company proposes to establish a mill in the Derwent Valley, Tasmania. The plans of the company are to produce, at first, 27,000 tons of newsprint annually which would eventually be increased to 100,000 tons annually. The company claims to have spent £300,000 already in experimental work to prove that the Australian hardwood eucalyptus regnans can be used successfully in the manufacture of newsprint.

Insulating board from sugar cane fiber is to be produced in Australia by the Colonial Sugar Refining Co., Ltd., it was announced recently. A factory now being constructed will have a capacity of 30,000,000 square feet of board a year. The plant will not begin production before the end of 1939, it was reported.

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ENGLISH NEWS

Board Production

The progress of the packaging industry in Great Britain is one of the most remarkable instances of production growth in any section of the trade, it has been reported recently. As a consequence the mills specializing in supplying the necessary boards are gradually adding to their equipment. Within the space of 25 years, the St. Anne's Board Mills at Bristol have reached a capacity output of 70,000 tons per annum. The plant, to which another machine has just been added, now includes six machines and complete coating plant of nine machines. By recent purchases of land, sufficient ground is available to double the size of the mill and the coating plant.

Trade Position

In practically every section trading is stagnant although here and there one hears of a few more inquiries. These are more in the nature of feelers but nevertheless it is generally believed that stocks of paper are becoming depleted and that it needs only a small amount of extra trading to set the wheels in motion again. It is significant that there is no talk of price movements either up or down.

Newsprint Prices

Newsprint on reels from the British mills is to remain at its present price, £11-10-0 per ton (2,240 lb.) until March, 1939, and for the remainder of the year to be reduced by 5/ per ton. At the same time the Scandinavian prices, C.I.F. British ports, is fixed at £9-10-0. British sheet prices will be £14 declining to £13-15-0 on April 1st next.

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ITALIAN NOTES

Mill Developments

There has been considerable developments in the Italian paper mills during recent years, it was reported lately.

In addition to the installation of new, major equipment, greater attention has been paid to the installation of secondary or accessory machinery not only for the production operations but also for the sizing and finishing operations. According to reports Italy is now in a position to produce any type paper needed by the internal market.

Cellulose Problem

The problem of making Italy independent of imported cellulose has been solved, to some extent, in three ways. Consumption has been limited, imported cellulose has been mixed with other cellulose and national production of cellulose has been increased. This last arrangement has necessitated the increased growth of forests and in addition has encouraged the utilization of raw materials other than wood. Italy now obtains cellulose from corn and rice straw, corn stalks, residues of sugar sorghum, hemp wastes, marsh canes, etc.

Markets

The warm weather did not bring about the slackness expected in Italy as the consumers had every interest in obtaining supplies because of the limitations maintained. The request for newsprint remained about the same in August as in the preceding month. Writing paper fell off somewhat and cellulose producers had an abundance of orders. The sales of mechanical wood pulp were also increased.

TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

Possible Manchurian Pulp Woods

A number of woods were examined analytically, and of these, the one with highest total cellulose content (65.0%) was *Tilia mandschurica* (basswood). The weight per unit volume of this wood was 0.72. The lowest weight per unit volume (0.37) observed was in the case of *Picea obovata* (which had a total cellulose content of 57.75%) and *Abies nephrolepsis* (which contained 55.3% cellulose). Laboratory pulping experiments with sulphite liquors containing varying amounts of total SO_2 were carried out in a 10 liter digester. The hardwoods under examination (one species of poplar, a basswood, and a Manchurian birch) were best delignified by using a cooking liquor containing 4.2% SO_2 and 1.15% CaO, and by running a 12 hour cook, with the temperature maintained at 141 deg. for 8 hours. The conifers (species of Picea, Abies, and Pinus) could be delignified in 10 hours (with 4 hours at 138 deg.) by using a liquor containing 5.2% total SO_2 and 1.15% CaO, or in 8 hours (with 3 hours at 140 deg.) by using a stronger acid, containing 7.9% total SO_2 and 1.87% CaO. Evidently, too, a specific poplar (*Populus maximowitzii*) could best be delignified with liquor containing either 5.18% or 7.94% SO_2. *Pinus Koraiensis* did not yield particularly satisfactory pulp. The longest fibers were obtained from *Abies nephrolepsis*, while the shortest were formed from *Populus tremula*. J. Miura and S. Maeno. Cellulose Industry (Japan) 13, 73-6 (1937) through Papier-Fabr. (Abstracts) 36, 90 (1938).

Spruce Wood and Thioglycolic Acid

The author reviews his previous attempts to delignify wood by alcoholysis and mercaptolysis and then describes experiments on the interaction of spruce wood with thioglycolic acid. By increasing the amounts of the reagent, it was possible to isolate a "demethylated lignin" having the approximate composition $C_9H_{10}O_4$, and which may contain more than one residue of thioglycolic acid for each nine carbon atoms. When wood has been previously heated with water, aqueous NaOH, or more especially dilute HCl, smaller yields of lignothioglycolic acids are obtained, and these derivatives also contain a smaller percentage of thioglycolic acid residues, than on identical treatment of the original wood. There appears to be a sulphidic linkage between lignin and the acid. The following schematic formulation tentatively shows the interaction of the lignin (abbreviated as Li.O.R) and ethanol: $Li.O.R + HOC_2H_5 \rightarrow Li.O.C_2H_5 + ROH$. Similarly with thioglycolic acid, the reaction is indicated as $Li.O.R + HSCH_2COOH \rightarrow Li.S.CH_2COOH + ROH$. It is thus left undecided whether R is hydrogen, or a carbohydrate residue, or another lignin molecule, or possibly a fission product of a lignin molecule. If bisulphite is used in place of $HSCH_2COOH$, in the second reaction, the product would represent the formation of lignosulphonic acid in the sulphite pulp process. Thirty-three references, some of them quite recent, are given. Bror Holmberg, Papier-Fabr., 36 24/5, 218-22. (1938)

Electrical Measuring Instruments

The article deals briefly but adequately with various types of electrical controls used in the pulp and paper industry. It includes eleven illustrations, two of which are reproduced herewith. The panel in Figure 1 indicates carbon dioxide, carbon monoxide and nitrogen, the flue gas temperature, the amount of steam, the steam pressure, and draft-velocity. Figure 2 shows the automatic control for temperature and sulphur dioxide of three sulphur burners in a sulphite mill. Fritz H. W. Loewe. Wochbl. Papierfabr. 69, 664-7 (1938).

Degradation of Wood and Straw by Various Chemicals

The authors have previously shown that spruce can be degraded with very concen-

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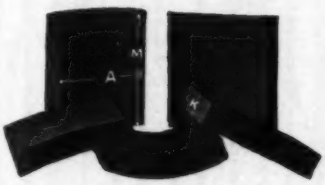

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trated solutions of sodium hydroxide without much heat. Evidently the amounts dissolved depend solely on the concentration of alkali used. When this concentration is sufficiently increased, the authors claim that all but eight to ten per cent of the wood enters solution. They advance the hypothesis that wood gum, which is normally extracted with dilute alkali, is not originally present in the wood, but is a chance product of the reaction. The same seems to be true in the case of other hemicelluloses and of cellulose itself. This rather sweeping hypothesis has been followed up by a series of experiments with other woods and with straws.

Cypress has about the same composition as spruce wood, but contains 1% more methoxyl. When this is treated with alkali in the presence of carbon bisulphide, there is a 24% residue containing 3.55% methoxyl, 49.1% carbon, and 6.46% hydrogen. When the alkaline solution is precipitated with acids, a 52% precipitate is obtained; and this contains 6.16% methoxyl, 50.8% carbon, and 5.94% hydrogen. A marked difference is noted in the case of straw, which, on treatment with alkali alone, yielded 20% residue, 0.88% methoxyl, 45.1% carbon and 6.3% hydrogen. In the presence of carbon bisulphide, these figures were respectively 16%, 0.85%, 41.1% and 6.42%. The precipitate from the alkali solution without carbon bisulphide gave respectively the following figures: 32%, 3.26%, 47.97%, 5.92%. Where alkali, as well as carbon bisulphide, had been used the precipitation by acids yielded the following respective figures: 50%, 3.43%, 47.77%, 5.82%. The authors also give corresponding values for red beech and for alder. When the precipitate by means of acid from alkaline extraction of spruce wood was treated a second time in the same way, the recovery was very nearly quantitative and the methoxyl content remained almost unchanged. This would indicate that NaOH treatment does not split off methoxyl groups.

The authors claim that if lignin formation is due largely to the methoxyl-containing components of the wood, the solutions described by them should prove satisfactory starting materials for the preparation of lignin, quite independent of the biological structure of the wood. In previous experiments with spruce wood, such attempts in isolating lignin were unsuccessful. The action of acid in concentrations used in converting wood into lignin always resulted in products that were soluble in hot water. With similar experiments with straw, a flocculent product was obtained which contained 11.4% methoxyl and only 50% carbon, and was thus very different from the usual straw lignin which contained, when isolated by 72% acid, 14% methoxyl and 60% carbon.

To further characterize the residues and precipitates briefly described above, the authors treated them with Schweizer's reagent. The precipitate which dissolved almost completely in this reagent gave the following figures which are respectively the percentages of methoxyl, carbon, hydrogen, and nitrogen reprecipitated: spruce wood, 75, 5.76, 48.0, 5.9, 1.64; straw, 70, 2.86, 46.26, 5.9, 0.87; red beech, 80, 3.02, 41.8,

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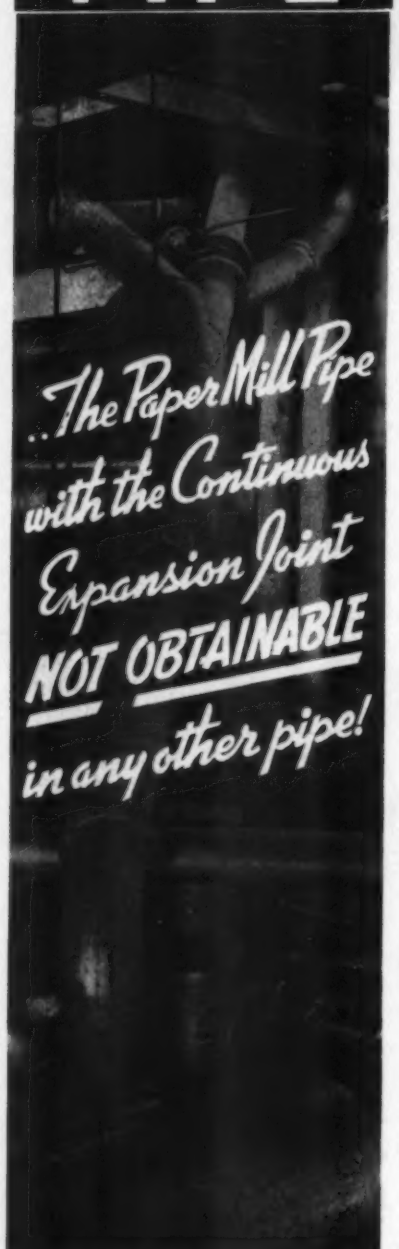

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6.2, 1.25; and alder, 80, 4.4, 39.9, 5.8, 3.6. Values are also given for the yields, methoxyl-content, and carbon and hydrogen content of residues insoluble in Schweizer's reagent. The authors emphasize the fact that cupramonium reagents are by no means harmless in their action on cellulose and other polysaccharides. Schweizer's reagent seems to form nitrogen-containing compounds which on treatment with acid give rise to cuproxam lignins that contain nitrogen.

One of the main conclusions of this entire work is that products of the composition $C_6H_{10}O_5$ are scarcely ever found and that there is no basis for the assumption that cellulose, as such, with its typical chemical properties, is actually present in wood. The wide chemical differences between the various woods and straw have also been emphasized. Richard S. Hilpert, and Werner Hansi. Ber. 71B, 933-7 (1938), through C. A., 32, 6055 (1938).

Molecular Nature and Porosity of Printing Papers

The rate of absorption of water or toluene by paper at the water-air or toluene-air interfaces or of the selective absorption at the water-toluene interface serve as measures of the degree of dispersity of fiber in the paper (i.e. porosity), and gives an insight into the nature of the fiber. The pore radius in papers (r) is determined from the following formula:

$$l^2 = \frac{E \times \cos.\theta \times r \times T}{2\eta}$$

where l is the height of the absorption at the liquid-air interface, where E is the surface tension of the absorbed liquid, where cos. θ is the wetability of the pore walls of the dispersoid, and where η is the viscosity of the liquid and T is the time of the absorption. Most papers are hydrophilic, and they are rendered more so by addition of most fillers. Ordinary sizes render them hydrophobic. The original paper shows an apparatus for the measurement of absorption of liquids by papers. L. A. Kozarovitskii, Colloid J. (U. S. S. R.) 3, 507-21 (1937) C. A. 32, 6128 (1938).

Ozone on Cellulose

The best conditions for the action of ozone on cotton linters were about 45 to 50 per cent moisture content and 40 deg. C, as judged by the copper number of the resultant oxycelluloses. Irrespective of whether normal cellulose, swollen cellulose, hydrocellulose or (methylene-blue type) oxycellulose are the starting materials, the copper numbers always increase on ozonizing. The rates for such Cu No. increases are about the same for the hydrocellulose and cellulose. They are more rapid for swollen cellulose and oxycellulose. They are quite slow for cellulose triacetate. The methylene blue numbers showed slight increases in the case of cellulose, swollen cellulose and hydrocellulose, but an actual decrease in the case of oxycellulose. The triacetate does not change in methylene blue value. After discussing their results, the authors indicate that ketone groups form during the oxidation with ozone. Charles Dorée and A. C. Healey, J. Text. Inst. 29. T 27-42 (1938).

Submicroscopic Structure of Cellulose

This structure, according to the author, consists of anastomising rods or microfibrillae with a cellulose chain lattice. The parts of this lattice which are homogeneous correspond to Nägeli's micellae, but these

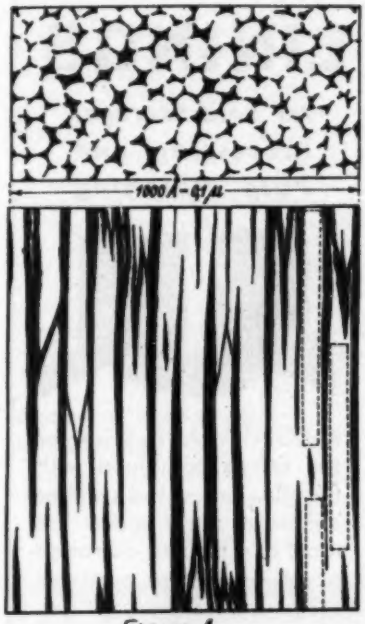


Figure 1.

are not conceived of as being independent entities, but are evidently all interknit. The fissures between the micelles are heterogeneous. Some of them are so minute that they are accessible only to agents which cause swelling. Others have so coarse a capillary structure that colloidal dyes (like Congo red) can penetrate. When the fiber is macerated, two phenomena are noted:—(a) the longinal separation of the micro fibrils from each other (by physico-chemical means) and (b) a transverse hydrolysis proceeding along predetermined "planes of

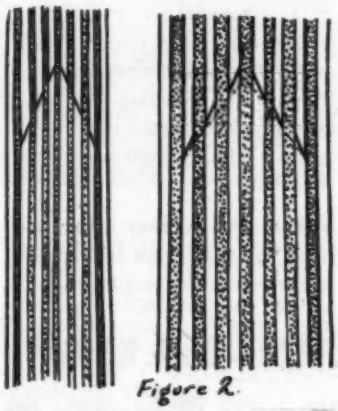


Figure 2.

hydrolysis". A schematic picture of the submicroscopic structure of native bast fibers in cross section (above) and longitudinally (below) is given in Figure 1. In Figure 2 is a schematic sketch of the so-called planes

of hydrolysis in native and in swollen micro fibrils. The author gives 20 recent references, including the recent work of Bailey and Vestal (J. Arnold Arboretum 18, 196 [1937]) on the corrosion of woody fibers, measurements on which are evidently in agreement with the work of the present author. A. Frey—Wissling, Papier Fabr. 36, Nos. 24-5, 212-7. (1938).

Polyhydroxyphenols and Viscose Ripening

Using two standardized methods of computing the time of ripening (by means of NH_4Cl and NaCl) and using the falling sphere method for computing viscosity, the authors have shown the effect of the addition of various phenols on the ripening of viscose. The ripening time is accelerated by carbolic acid, and this acceleration is dependent on the percentage of phenol added. However, polyhydroxyphenols are better accelerators than is carbolic acid. This was shown in the case of pyrocatechol, resorcinol, pyrogallol and phloroglucinol. If all hydroxyl groups (except one) are replaced by methoxyls, the effect becomes approximately that of phenol itself, indicating that the number of OH groups is a factor in accelerating the ripening process and the change in viscosity. P. Eckert, E. Herr, and E. Swatek. Papier-Fabr. 36 (Internationale Ausgabe 1938), 282-98.

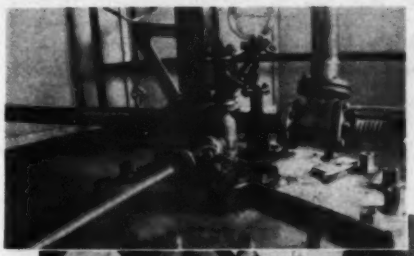
Organic Compounds from Sulphite Liquor

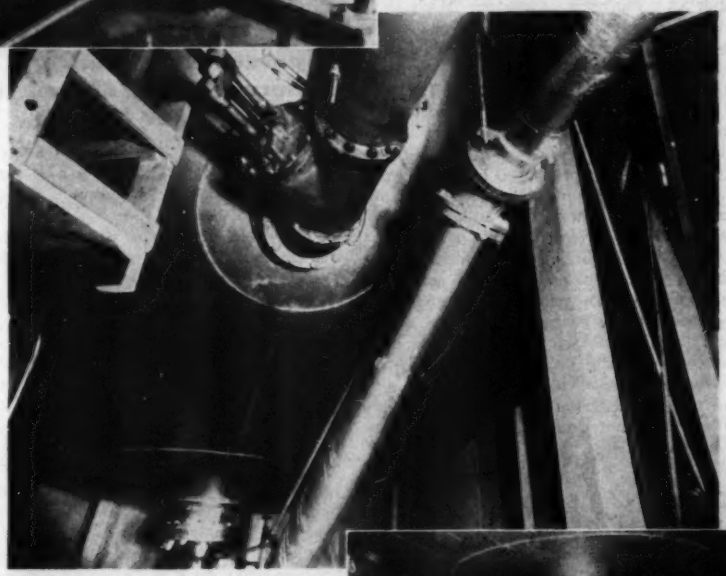
About 114 liters of technical sulphite liquor (waste product from cooking of coniferous woods) was heated with NaOH under pressure. The reaction mixture was extracted with benzol and yielded 297.5 grams of vanillin. The residue a dark, viscous oil gave three fractions on distillation in vacuo. The middle fraction when recrystallized from benzol gave pure acetovanillone (m. p. 114.5 deg.) the identity of which was shown by comparison with the synthetic product. Acetovanillone could also be formed directly from isolated lignosulphonic acid. At the same time small amounts of guaicol are formed. As a result of these findings Hibbert discounts the theories of Freudenberg or of Hilpert and suggests a guaicol condensation product with fructose (or some derivative) as the lignin precursor. I. K. Buckland, G. H. Tomlinson and Harold Hibbert, Can. J. Research 16B, 54 (1938); also F. Leger and H. Hibbert, Ibid, 68 (1938) through Papier-Fabr. 36 (Abstracts) 100 (1938).

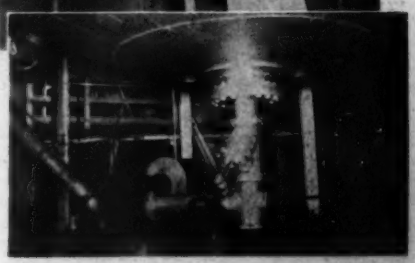
Akaematsu in Pulp Making

This wood (*Picea glehnii*, Mast) gave the best results. Other woods from Korea, S. Sakhalin and Manchukuo gave inferior pulps, or were less easily delignified. Evidently the most important Manchukuoan conifers were least readily pulped. On the basis of chemical composition, these woods are very similar, so the discrepancies are due to physical differences. Akaezmatsu is found in S. Sakhalin, Y. FuKuda, S. Michitaka and M. Yamaguchi. Cell. Ind. (Tokyo) 13, 477-51 (1937), C. A. 32, 6455. (1938).

ACID ACCUMULATORS for PAPER MILLS...







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PAPERMAKING PATENTS

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Control Mechanism for Paper Making Machines

Patent No. 2,122,362. Avery H. Stanton, Dedham, Mass., assignor to Eldon Macleod, Frank A. Morrison, Cameron Macleod, Leslie Soule, and Sullivan A. Sargent, Jr., trustees, doing business as Mason-Neilan Regulator Company, Boston, Mass. Application April 30, 1935, Serial No. 18,979. 7 Claims. (Cl. 34—48). A moisture control mechanism for paper making machines comprising a drying cylinder, the moisture in the paper sheet passing over which is to be controlled, a source of heating medium for heating said cylinder, a control valve governing supply of heating medium to said cylinder, a pilot mechanism utilizing an independent source of pressure for operating said control valve, an element responsive to the temperature of said drying cylinder, and joint means operated by the tension of said sheet and by said temperature responsive element for controlling said pilot to reset the temperature of said cylinder in proportion to changes in sheet moisture.

Method of Making Washable Paper

Patent No. 2,123,399. Charles G. Bright, deceased, late of Appleton, Wis., by Ruth E. Bright, Appleton, Wis., administratrix, assignor to Paper Patents Company, Neenah, Wis., a corporation of Wisconsin. Application May 2, 1935, Serial No. 19,424. 4 Claims. (Cl. 92—40). A method of producing washable paper, comprising forming a paper web carrying a potentially water-resistant protein coating in an aqueous carrier, applying during the paper making operation a material which will chemically fix said coating, drying the web, then softening the dried coating and printing on said softened coating with a water-insoluble ink.

Process and Apparatus for Coating Paper

Patent No. 2,118,212. James D. MacLaurin, South Orange, N. J. Application April 24, 1933, Serial No. 667,676. 19 Claims. (Cl. 91—45). In a coating machine, in which a web of sheet material is treated, means for moving the web longitudinally, a plurality of spray nozzles disposed at points spaced transversely of and adjacent the path of movement of said web, means for supplying said nozzles with coating fluid and means for completely rotating said nozzles about an axis extending transversely of the path of movement of said web and substantially parallel to the web surface on the side of the web to which coating is applied. A process of coating paper for printing purposes which comprises discharging liquid coating material under superatmospheric pressure in company with air under superatmospheric pressure in the form of a spray on to the surface of a continuously advancing web of paper, and discharging jets of air under superatmospheric pressure into the spray as it approaches the web surface to further subdivide and distribute the spray.

Apparatus for Securing Uniform Drying of the Sheet in Paper Making Machines

Patent No. 2,119,771. Arthur E. Broughton, Neenah, Wis. Application September 16, 1935, Serial No. 40,754. 5 Claims. (Cl. 34—48). In a paper making machine, a plurality of driers over which the sheet passes, a steam line for supplying all of said driers, a main valve controlling the supply of steam through at least a portion of said line, a by-pass around said main valve, an auxiliary valve in said by-pass, a pressure responsive device for operating said auxiliary valve, means connecting said pressure responsive device to a certain section of said driers most closely adjacent the wet end of the machine, said pressure responsive device acting to more widely open said auxiliary valve as the pressure in said certain section drops slightly below a certain constant and acting to tend to close said auxiliary valve as the pressure in said certain section rises slightly above said certain constant.

Method of Manufacturing Moisture and Moisture Vaporproof Papers

Patent No. 2,118,152. William H. Bryce, Memphis, Tenn., assignor to Dixie Wax Paper Company, Dallas, Tex., a corporation of Texas. Application May 8, 1935, Serial No. 20,479. 5 Claims. (Cl. 91—68). The process of preparing moisture vapor proof paper which comprises coating one side of said paper with wax, coating the opposite side of said paper with wax only along opposite edges and coating said paper with resinous material between said last mentioned wax coatings.

The Stock Process and Apparatus for Making Paper

Patent No. 2,122,394. Carlton H. Allen, Glens Falls, N. Y. Application October 6, 1936, Serial No. 104,220. 3 Claims. (Cl. 92—46). The process of making paper comprising screening a pulp, flowing the main body of the pulp directly to a paper stock meter, thickening some of the pulp to increase the consistency thereof, regulating the rate at which the thickened pulp rejoins the main body of the pulp, supplying other paper making ingredients to said meter, metering each ingredient to form a common stream of paper stock, mixing with said stream a stream of water containing all of the pulp which drains through the paper machine wire near the breast roll and delivering the mixture to the paper machine.

In a paper making apparatus, the combination of screens for screening a pulp, a meter for metering said pulp, means for moving the screened pulp to said meter, means for diverting some of the screened pulp and extrating some of the water therefrom and means for returning to the screened pulp the portion from which the water was extracted to regulate the consistency of said screened pulp in advance of said meter.

Paper Manufacture

Patent No. 2,123,958. Roland A. Packard, Lee, Mass., assignor to Smith Paper, Inc., Lee, Mass., a corporation of Delaware. Application January 2, 1935, Serial No. 115. 20 Claims. (Cl. 92—20). In the manufacture of paper, the method which includes bleaching rag half stock, feeding the bleached stock to moving wringer means, and bleeding or bypassing a part of the stock being fed to the wringer means in order to regulate the rate of flow of stock thereto, the stock being handled in a continuous active state of movement, and being given no opportunity to dwell and settle.

Paper Coating

Patent No. 2,119,508. Philip S. Barnhart, Westfield, Mass., assignor to Westfield River Paper Company, Inc., Russell, Mass., a corporation of Massachusetts. Application June 19, 1936, Serial No. 86,081. 4 Claims. (Cl. 134—17). A flowable coating comprising chlorinated rubber, resin, comprising glycerol abietate and 5–13% para coumarone, paraffine wax, a plasticizer and a solvent in which the ingredients are soluble, the ingredients being combined in such proportions as to form a flexible, moisture-proof or moisture resistant, transparent and non-tacky film upon evaporation of the solvent.

Process and Apparatus for the Manufacture of Paper

Patent No. 2,124,028. Edgar Alexander Charlton, New York, N. Y., assignor to International Paper Company, New York, N. Y., a corporation of New York. Application December 17, 1934, Serial No. 757,767. 1 Claim. (Cl. 92—45). In an apparatus for the manufacture of paper and the like, a paper making screen on which a fibrous stock containing water is deposited and through which water is drained to form a web of fibrous material, a shake device positioned beneath said screen to impart thereto vibrations to distribute said fibres evenly throughout said web and to enhance felting thereof comprising a base, cylinders supported by said base, plungers mounted for reciprocation in said cylinders, and means to reciprocate said plungers, the upper faces of said plungers at the top of their stroke being below the top of said cylinders, the water draining through said screen and collected in said cylinders serving to transmit the upward thrust of said plungers to the screen.

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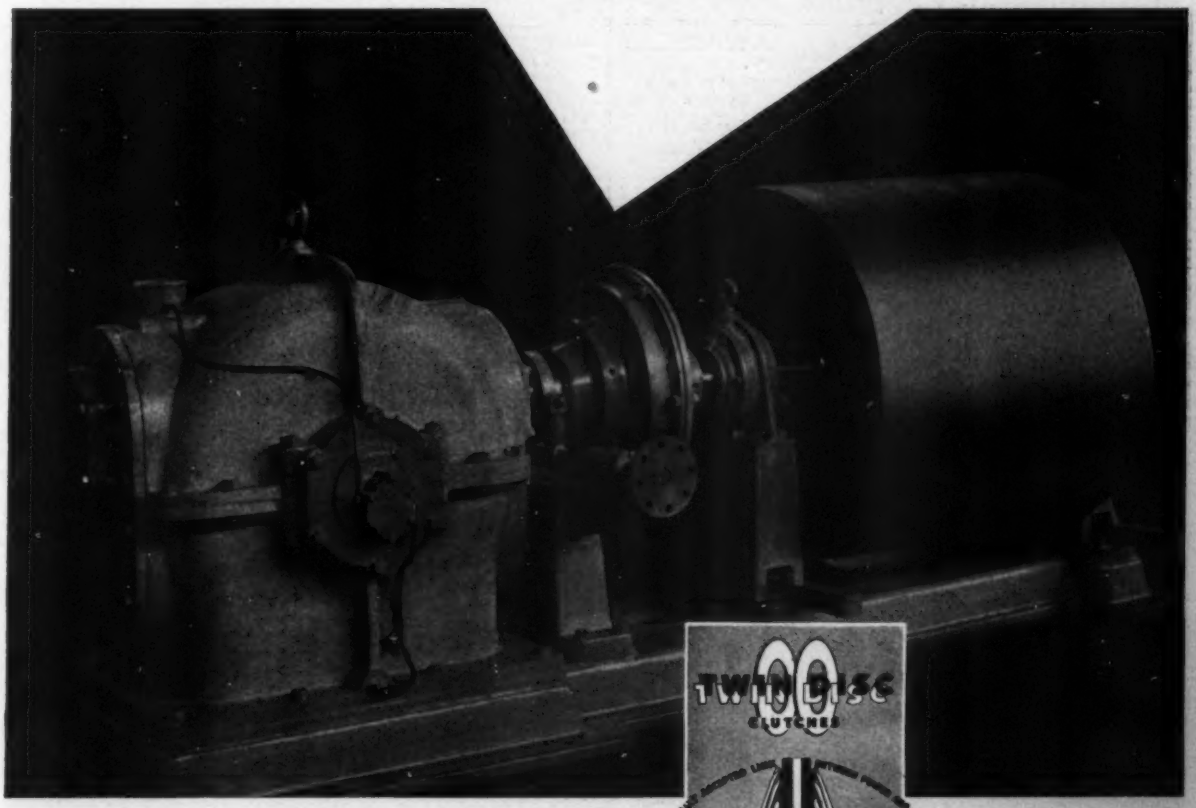

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(*Continued from page 641*)

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   b. Creating and retaining employee's pride in job, including pride in the products he helps produce.
   c. Fostering mental and physical improvements.
   d. Stimulation of home appreciation.
   e. Reduction of accidents by promoting adherence to safety rules.
   f. Simple explanations of company ambitions.
   g. Encouragement of thrift, systematic saving and insurance.
   h. Development of *esprit de corps* and friendliness between the workers themselves.
   i. Simple explanations of your policies, your potential future markets, your quality standards, your opinions of present and future business conditions in general, etc.
2) Creation and maintenance of a better standing for the company as a whole in the community (a vital issue today and tomorrow!)

A huge task? Not so huge as it seems. An important activity under current and future conditions? Probably your *most* important activity!

Quoting Mr. Harold H. Swift, of Swift & Company: "It is not enough to give employees a square deal,—they must be shown that they are getting it." Indeed, organizations who intend to stay in business are about to "merchandise" themselves at last.

THE PAPER INDUSTRY SAFETY CONTEST

July 1, 1938 to June 30, 1939 — **69 Mills Have Perfect Record**

JULY SCORES

PERFECT SCORE
Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A	Hollingsworth & Whitney Co.	Algonquin & Taconnet Mills	Waterville, Me.
	Spruce Falls Power & Paper Co., Ltd.	Kapuskasing	Ontario, Canada
	Oswego Falls Corporation	Fulton	New York
	Anglo-Canadian Pulp & Paper Mills, Ltd.	Quebec City, P. Q.	Canada
	Gulf States Paper Corp.	Tuscaloosa	Alabama
	Bird and Son, Incorporated	East Walpole	Massachusetts
	Consolidated Paper Corp., Ltd.	Port Alfred, P. Q.	Canada
GROUP B	The Mead Corporation	Kingsport	Tennessee
	Paterson Parchment Paper Co.	Bristol	Pennsylvania
	Nekoosa-Edwards Paper Co.	Port Edwards	Wisconsin
	The Mead Corp.	John H. Heald Div.	Lynchburg, Va.
	Consolidated Paper Corp., Ltd.	Belgo, Shawinigan Falls	Canada
	American Box Board Company	Grand Rapids	Michigan
	Flintkote Company	Pioneer Division	Los Angeles, Cal.
	Berst-Forster-Dixfield Co.	Plattsburg	New York
	A. P. W. Paper Company, Inc.	Albany	New York
	Crown Zellerbach Corporation	National Paper Products Co. Div.	Port Townsend, Wash.
	Detroit Sulphite Pulp & Paper Co.	Detroit	Michigan
	Fraser Paper, Ltd.	Madawaska	Maine
GROUP C	Southern Kraft Corporation	Marinette	Wisconsin
	St. Croix Paper Company	Woodland	Maine
	Champion Paper & Fibre Co.	Houston Division	Houston, Texas
	Rayonier Incorporated	Hoquiam	Washington
	Cornell Wood Products Co.	Cornell	Wisconsin
	Hoberg Paper Mills, Inc.	Fibre Div.	Green Bay, Wis.
	Strathmore Paper Company	W. Springfield	Massachusetts
	The Crystal Tissue Company	Middletown	Ohio
	Strathmore Paper Company	Woronoco	Massachusetts
	The Mead Corporation	Sylva Paperboard Co.	Sylva, N. C.
	Escanaba Paper Company	Escanaba	Michigan
	The Lawrence Paper Company	Lawrence	Kansas
	Port Huron Sulphite & Paper Co., Pulp Mill	Port Huron	Michigan
GROUP D	The Mead Corporation	The Harriman Co.	Harriman, Tenn.
	The Mead Corporation	Southern Extract Co.	Knoxville, Tenn.
	American Writing Paper Corp.	Riverside No. 2	Holyoke, Mass.
	Bird and Son, Inc.	Phillipsdale	Rhode Island
	French Paper Company	Niles	Michigan
	Terre Haute Paper Company	Terre Haute	Indiana
	American Writing Paper Corp.	Linden Division	Holyoke, Mass.
	The Upson Company	Lockport	New York
	Crown Zellerbach Corp.	Crown Willamette Paper Co. Div.	Lebanon, Ore.
	American Asphalt Roof Corp.	East St. Louis	Illinois
	Rayonier, Inc.	Shelton Division	Shelton, Wash.
	American Writing Paper Corp.	Nonotuck Division	Holyoke, Mass.
	American Writing Paper Corp.	Parsons	Holyoke, Mass.
	International Paper Company	Webster Mill	Orono, Maine
	Container Corp. of America	Circleville	Ohio
	Spaulding Fibre Company, Inc.	Milton Plant	Milton, N. H.
	International Paper Co.	Livermore No. 11	Livermore Falls, Me.
	United States Gypsum Company	N. Kansas City	Missouri
	Rayonier, Incorporated	Port Angeles	Washington
	American Writing Paper Corp.	Mt. Tom Division	Holyoke, Mass.
	Ponds Extract Company	Seymour	Connecticut
	International Paper Company	Riley No. 23	Riley, Maine
	Hollingsworth & Whitney Co.	Aroostook & Cobbossee Mills	Gardner, Maine

PERFECT SCORE
Division II—Paper and Board Re-Manufacturing

Union Bag & Paper Corp.	Specialty Bag Factory	Hudson Falls, N. Y.
Bird & Son, Incorporated	Norwood	Massachusetts
The Flintkote Company	Chicago Heights	Illinois
Container Corp. of America	Chicago	Illinois
Barber Asphalt Corp.	Madison	Illinois
F. J. Kress Box Company	Pittsburgh	Pennsylvania
Container Corp. of America	Anderson	Indiana
Bird & Son, Incorporated	Chicago	Illinois
The Container Company	Van Wert	Ohio
Kimberly-Clark Corporation	Atlas Mill	Appleton, Wis.
Bemis Brothers Bag Company	East Pepperell	Massachusetts
Gaylord Container Corp.	Dallas	Texas
Gaylord Container Corp.	Houston	Texas
Bird & Son, Incorporated	Shreveport	Louisiana

IMPERFECT SCORES

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP A	P- 9	8	1	4.958
	P- 18	9	1	6.315
	P-140	10	1	6.856
	P- 69	11	1	6.904
	P-126	12	2	7.133
	P- 13	13	1	7.524
	P- 44	14	1	8.024
	P- 30	15	1	8.031
	P- 71	16	1	8.937
	P- 12	17	1	8.976
	P- 21	18	1	9.363
	P- 1	19	3	10.334
	P- 70	20	2	13.776
	P- 73	21	3	15.644
	P- 67	22	3	17.041
	P-102	23	3	22.484
	P- 84	24	4	23.105
	P- 27	23	6	25.880
	P-114	26	3	26.237
	P-156	27	4	27.863
	P- 40	28	6	37.063
GROUP B	P- 23	13	1	10.928
	P- 60	14	1	11.367
	P-127	15	1	11.470
	P- 68	16	1	11.950
	P- 26	17	1	12.060
	P- 45	18	1	12.578
	P- 64	19	1	12.692
	P- 54	20	1	14.361
	P-142	21	1	14.616
	P-137	22	1	15.177
	P-124	23	1	16.555
	P- 2	24	2	20.327
	P-153	25	3	40.062
	P- 59	26	3	42.459
GROUP C	P-143	14	1	19.614
	P- 29	15	1	21.143
	P- 56	16	1	21.888
	P- 43	17	1	26.492
	P-100	18	1	29.061
	P-134	19	1	33.220
	P-113	20	2	41.621
	P-111	21	2	43.010
	P- 41	22	3	57.831
	P- 48	23	2	57.859
GROUP D	P-103	24	1	34.569
	P-157	25	1	38.696
	P-146	26	1	39.568
	P- 14	27	1	42.719
	P- 42	28	1	51.248
	P-125	29	1	57.359
	P- 99	30	1	60.085
	P- 17	31	2	67.433
	P- 47	32	2	69.062
	P- 50	33	2	75.574
	P-106	34	2	95.570
	P-117	35	2	109.409
	P-116	36	3	113.464
	P-158	37	3	115.163
	P- 81	38	3	127.992
	P-147	39	1	128.287

Division II—Paper and Board Re-Manufacturing

	R-23	15	1	12.354
	R-37	16	1	18.196
	R-21	17	1	20.373
	R-28	18	1	22.841
	R-27	19	1	24.367
	R-31	20	1	26.909
	R-26	21	1	29.078
	R-36	22	1	31.201
	R- 1	23	3	35.602
	R-19	24	1	37.082
	R-34	25	3	43.615
	R-11	26	1	73.929
	R-32	27	1	86.207

July report missing: P-130, P-131, P-132, P-32, P-34, P-35, P-36, P-37, P-38, P-28, P-101, P-154, P-120, P-58, P-62, P-104, P-82, P-159, P-119, R-6, R-30.

Buying cheap merchandise to save money is like stopping a clock to save time.

●

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PARCHMENT, KALAMAZOO, MICHIGAN

Facts About Accidents in the Paper & Pulp Industry

Interesting and Valuable!

What were the outstanding facts about accidents in the Paper & Pulp Industry during 1937? How did they compare with other industries? How did your plant's record compare with others?

These and many other revealing and important data are presented in detail in "1937 Accident Rates In the Paper & Pulp Industry", recently published by the National Safety Council. We'll be glad to send a copy FREE to any Safety Director or other plant executive upon request. Simply drop us a line on company letterhead.

Contents . .

Outstanding Facts
Comparison with other Industries
Experience by Type of Industry
Experience in various types of Mills
Experience in various Departments
Causes of Serious Accidents
Disabling Injuries by Industrial Groups
Types of Accidents
Best All-Time Records
Individual Plant Records

PAPER & PULP SECTION NATIONAL SAFETY COUNCIL TWENTY NORTH WACKER DRIVE CHICAGO ILL.

SAFETY

SAFETY CONGRESS WILL CELEBRATE SILVER JUBILEE

TWENTY-FIVE years ago, an unpretentious office was opened in the Chicago loop. The office was opened, not for commercial enterprise or for professional practice, but for far bigger reasons than these. It was opened for the express purpose of saving lives, and so important has this office become that on October 10-14, thousands of men and women from the United States and abroad will gather in Chicago to pay tribute to, and aid in, its far-reaching and all-important work. The National Safety Council, more than a success, is a living institution, which throughout its twenty-five years of existence has more than lived up to its unofficial title of "The patron saint of the American workman's life and limb."

Less than 500 persons registered at the 1914 Safety Congress in Chicago, and only eight general sessions comprised the three-day program. On October 10-14, 1938, even the Stevens Hotel, the world's largest, cannot hold all of the 125 sessions with a total attendance of several thousand, and space in adjoining hotels on Michigan Boulevard will be required for the meetings at the Silver Jubilee Congress—more than adequate proof of the strides taken by this organization toward the protection and safe-guarding of human life and limb.

Many interesting discussions have been planned for the Paper and Pulp Section of the National Safety Council at the forthcoming Congress. All meetings of the Paper and Pulp Section will be held at the Stevens Hotel.

On Monday afternoon, October 10, General Chairman George B. Adams, of the International Paper Company, will review the past year's activities and progress of the section. During the same afternoon there will be pertinent and informative addresses by A. B. Hansen, general manager of Northern Paper Mills; Dr. H. S. Hulbert, psychiatrist, and Leon Shaffrey, yard superintendent, Bowaters Newfoundland Pulp and Paper Mills, Ltd. Election of officers will follow.

On Tuesday afternoon there will be addresses by M. W. Dundore, production manager of the Beloit Iron Works; G. J. Bienvenu, superintendent of Bogalusa Container Division of the Gaylord Container Corp.; Colonel Thomas Dobbins, medical and safety director, Servel, Inc.; and F. W. Braun, chief engineer, Employers Mutuals. There will be a discussion period after each address.

There will be a luncheon given on Thursday, October 13, at which time A. Scott Dowd, chairman of the Contest Committee, will give data on the 1937-38 safety contest. The highlight of the luncheon will be the presentation of the National Safety Council trophies and THE PAPER INDUSTRY trophy. The latter will be presented by E. B. Fritz, publisher of THE PAPER INDUSTRY and PAPER WORLD.

On the same afternoon there will be an additional address given by Dr. Louis H. Frechtling of the Champion Paper & Fibre Company. Following this, there will be a round table discussion of paper mill problems, at which time the following will give ten-minute talks: D. B. Chant, secretary-engineer, Ontario Pulp and Paper Makers' Safety Association; R. G. McGivney, Oswego Falls Corp.; J. A. Limpert, Kimberly-Clark Corp., and R. W. Croucher, Minnesota and Ontario Paper Company.

Tuesday, October 11, is Paper and Pulp Section Day, and all representatives are urged to visit the Safety Exposition, which will be in Exhibition Hall, on that date.

The Silver Jubilee Banquet will be given October 12 in the grand ballroom of the Stevens. D. D. Fennell, president of the Safety Council, will preside, and the principal speaker will be Dr. George E. Vincent, past-president of the Rockefeller Foundation, and vice-president of the National Community Chest Fund, New York City. Dr. Vincent is a noted educator, author, and world traveler, and is considered one of the best informed and most dynamic speakers on the American platform. His topic will be "The Larger Selfishness."

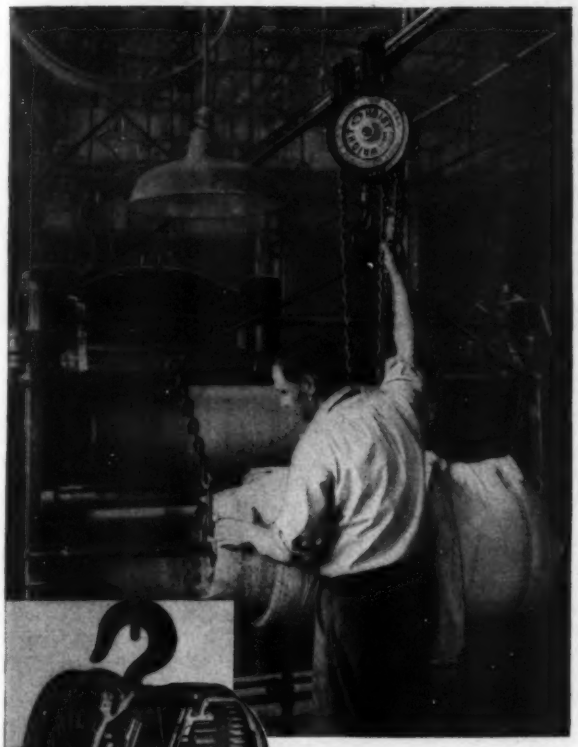
The Stevens Hotel, headquarters of the National Safety Congress, overlooks Chicago's famed Michigan Boulevard and Grant Park.

◆

▸▸▸ AN ACCIDENT at the Chemical Paper Mfg. Company, Holyoke, Mass., resulted in serious injuries to Joseph Lupien, employee of the company, who became caught in a rotary cutter.

◆

▸▸▸ NO LOST-TIME ACCIDENTS for the first six months of the year is the record of the George A. Whiting Paper Company, Menasha, Wisconsin. This present standing bids fair to equal the company's perfect record of last year.



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● The inherently fine construction of the Wright High Speed Hoist makes it an exceptionally efficient production tool.

Every feature of this hoist spells quality—the zinc coated finish which defies corrosion; the precision load wheel bearings; the load chain guard and all the rest of the twenty-one features, assure you a hoist which will amply meet all requirements.

The illustration above shows a Wright High Speed Hoist in use as a production tool in a large rubber plant. This is but typical of the many industries which consider the Wright to be just right for their purposes.

The new Wright catalog will be extremely helpful to you in many ways. Write for it right now.

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WRIGHT *Improved High Speed* **HOISTS**

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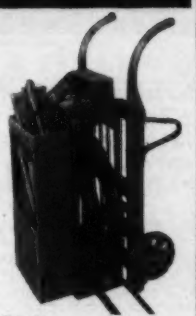
BRACED IN 15 MINUTES!

TIME-SLASHING is only one of several advantages of Stanley Car Banding. Yet it alone will cut your costs — improve your customer service with quick freight getaway!

SAVE AS MUCH AS 75% of your bracing labor! This load of paper was Stanley Car Banded and the doors closed approximately 15 minutes after the skids were placed in the car. Bracing that requires from one to three or four hours with wood takes, on the average, about 30 minutes with Stanley equipment.

SAVE on lumber for bracing, plus many pounds dunnage with lighter Stanley materials.

INCREASE PROTECTION while you save time and money! The Freight & Claims Division of the A. A. R. verifies that damage claims are substantially reduced with Car Banding compared to wooden bracing. Stanley engineers will find the most efficient, economical method for you.



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STANLEY

CAR BANDING SYSTEM

PULP
BLEACHING
COMPANY

ORANGE
NEW JERSEY

CELLULOSE
PURIFICATION

(Continued from page 664)

The efficiency of a steam turbine, or its ability to utilize the available heat head, decreases with decreasing turbine size because internal friction, blade leakage losses and other loss items represent a larger and larger proportion. If the exhaust pressure is increased in ratio to the inlet pressure so that only a small heat head is available, then the losses in inlet valves, etc., become important, with consequent reduction in efficiency.

Adoption of high steam pressure for industrial turbines usually leads to the use of the "automatic extraction pressure machine." This type of turbine is designed so that a variable amount of steam can be extracted for process uses at any desired intermediate pressure which can be maintained constant at all loads. Caution, therefore, should be used in specifying operating conditions for turbines with automatic extraction openings so that the turbine designer can adapt the machine as much as possible to the most prevailing steam flow conditions of the particular plant.

With increase in pressure, there is increased cost of equipment; and it naturally comes to a point where the fixed charges and interest on the increased cost of equipment offset the gain in heat economy for the particular plant. There is considerable difference of opinion as to what constitutes a proper precentage for fixed capital charges, which cover interest, depreciation, insurance, and taxes. Commonly used figures vary between eleven and fifteen per cent per year on the total capital expenditure, while, in some special cases, higher figures are used, due to future uncertainties. It would seem that, for power plant installations, a fixed charge of 12 per cent should represent a fair average.

For a given plant, it is fairly easy to divide the fuel cost between power and process steam if one assumes that all process heat is charged at full heat value, or, in other words, that the generation of power gets the entire credit for the savings of "by-product power generation;" but, if these "mutual" fuel savings are to be divided between process steam and power, then the question can be settled only by an arbitrary division. It is difficult to properly allocate fixed charges on the power plant between power and process steam, as one also must estimate what the plant would have cost if there were no power generation, and, in this case, the boiler plant would be of entirely different design.

Before any general conclusions are made as to the relative merits of different steam pressures for a new plant, it should be emphasized that each installation is a problem in itself and can only be analyzed as such. For a new paper mill power plant with approximately 2500 kw. turbine capacity and approximately 75,000 pounds per hour steaming capacity, the most economical steam pressure is between 400 and 450 pounds gauge. With a turbine capacity of 5,000 kw. and a boiler room steaming capacity of approximately 150,000 pounds per hour, the most economical steam pressure is between 600 and 650 pounds gauge;

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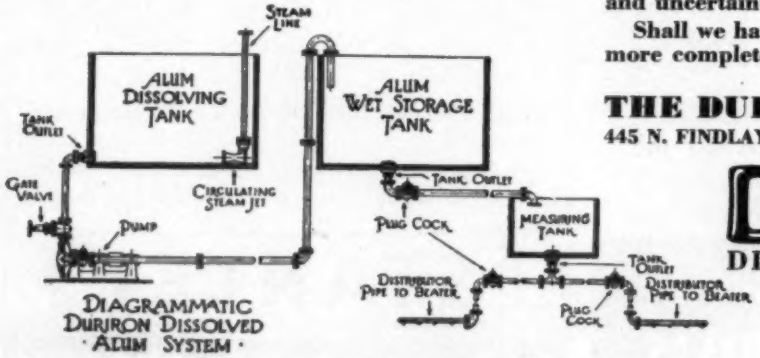
YOU can get exact control . . . exact measurement of the solution used . . . exact amount of alum . . . exact pH control.

And it's easy to do with a Duriron Dissolved Alum System.

You don't run the chance of making the paper brittle, corroding the wires, deteriorating the felts, with too much alum. And you don't run the risk of poor sizing and weak paper with not enough alum.



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Labor is reduced . . . size precipitation is better . . . many specks and spots eliminated . . . you make sizeable savings in dollars and cents.

The diagram shows the features of a Duriron installation. All parts . . . pump, valves, jets, pipe and fittings . . . are free from corrosive attack.

The cost of the installation is small compared to the benefits derived through a better quality of paper, saving in alum and freedom from the waste and uncertainty of other methods.

Shall we have a Duriron Technical Man give you more complete information? No obligation.

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445 N. FINDLAY ST. DAYTON, OHIO

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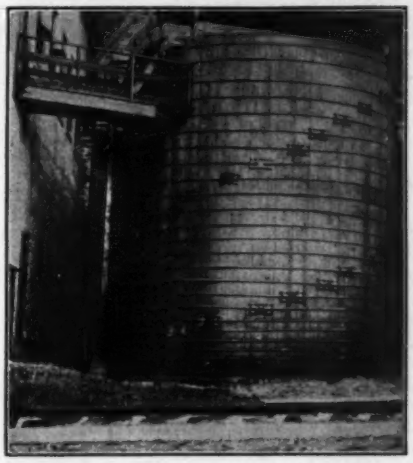
DISSOLVED ALUM SYSTEM

Write **KALAMAZOO**

for ACID TANKS and BLOW PITS



Acid storage tank at Nekoosa - Edward's Paper Co., Inc.

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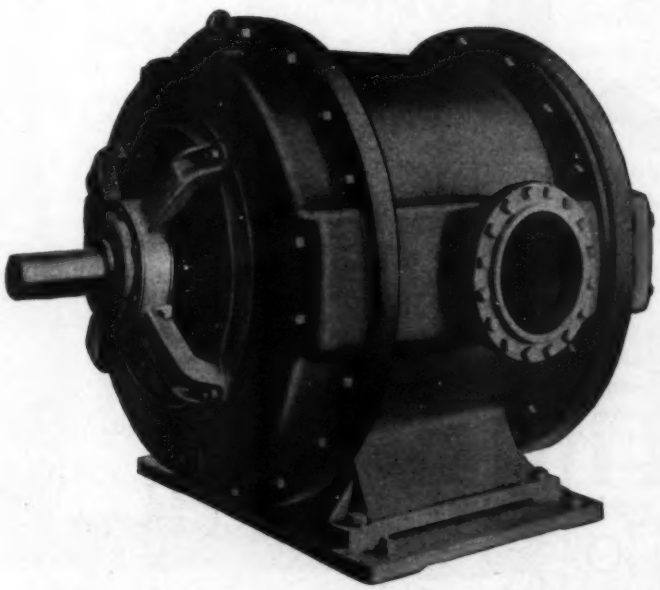

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but the net annual saving after allowing for fixed charges over that which would be obtained with the 450 pound installation is small. With a turbine room capacity of approximately 12,500 kw. and a boiler room capacity of 375,000 pounds per hour, the maximum economy is obtained with a steam pressure approximating 850 pounds gauge; but the net savings over 650 pounds gauge are small.

Steam Generation For Paper Mills

M. H. KUHNER[1]

Pulp and paper mills consume large quantities of steam and power. They are in an ideal position to produce power substantially as a by-product of steam which is otherwise required for the manufacture of the principal product.

A study of possible improvements in existing mills by the installation of new steam generating equipment, turbines and generators, or simply by modernizing the equipment already installed to make it more efficient, generally reveals that a comparatively small investment will so reduce the fuel bill as to place the mill in a favorable competitive position. The majority of modern mills generate steam at pressures between 500 and 650 lb. and at temperatures between 600 and 750 deg. Fahr.

In the selection of steam generating equipment for pulp and paper mills the following basic requirements must be recognized.

1. The boiler must be able to respond quickly to sudden and extreme load changes which usually occur suddenly.

2. Another consideration is the relatively small amount of condensate returned to the boiler house, necessitating the use of large amounts of make-up water in the boiler feed.

3. Of equal importance is the cleanliness of steam, especially when used at high pressure and high temperature in steam turbines.

4. The close relationship between cost of steam and cost of finished paper product necessitates high boiler efficiencies.

5. Finally and above all, boilers in paper mills must be reliable.

The trend in modern industrial plants is definitely toward the use of a small number of highly efficient boilers of large capacity. To avoid investment in non-productive units, stand-by boilers are frequently omitted. Dependability of boilers, therefore, is now of much greater importance.

Preference for pulverized coal firing in paper mills is explained by the greater sensitivity of this method of firing to sudden steam load changes. Furthermore, it is generally admitted that a larger variety of types and grades of coal can be burned satisfactorily in pulverized form than stokers.

It is not unusual for paper and pulp mills to cut the annual fuel and power bill in half, simply by replacing antiquated steam generating and fuel burning equipment with modern, efficient units, and by generating the power required in the mill as a by-product of the process steam.

[1]Chief Mechanical Engineer, Riley Stoker Corp., Worcester, Mass.

Knox Felt

EXCELSIOR KNOX Woolen Co. Mill Camden, Me. FINE & JACKET

HIGH POROSITY

. . . as a characteristic of a paper maker's felt will, not only add to the life of felt, but saves time lost on the machine due to excessive shut downs for washing. Specify

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and minimize this trouble. Made by the Knox Woolen Co., of Camden, Maine, since 1864.

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Wires of quality . . . woven, seamed, surfaced, to yield the utmost in service. Improved by Lindsay, who practicalized Longcrimp and Spiral Weave wires. Materials, manufacturing, research, as you yourself would have them. Facilities given over to working exclusively with the paper industry for more than three decades.

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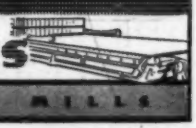
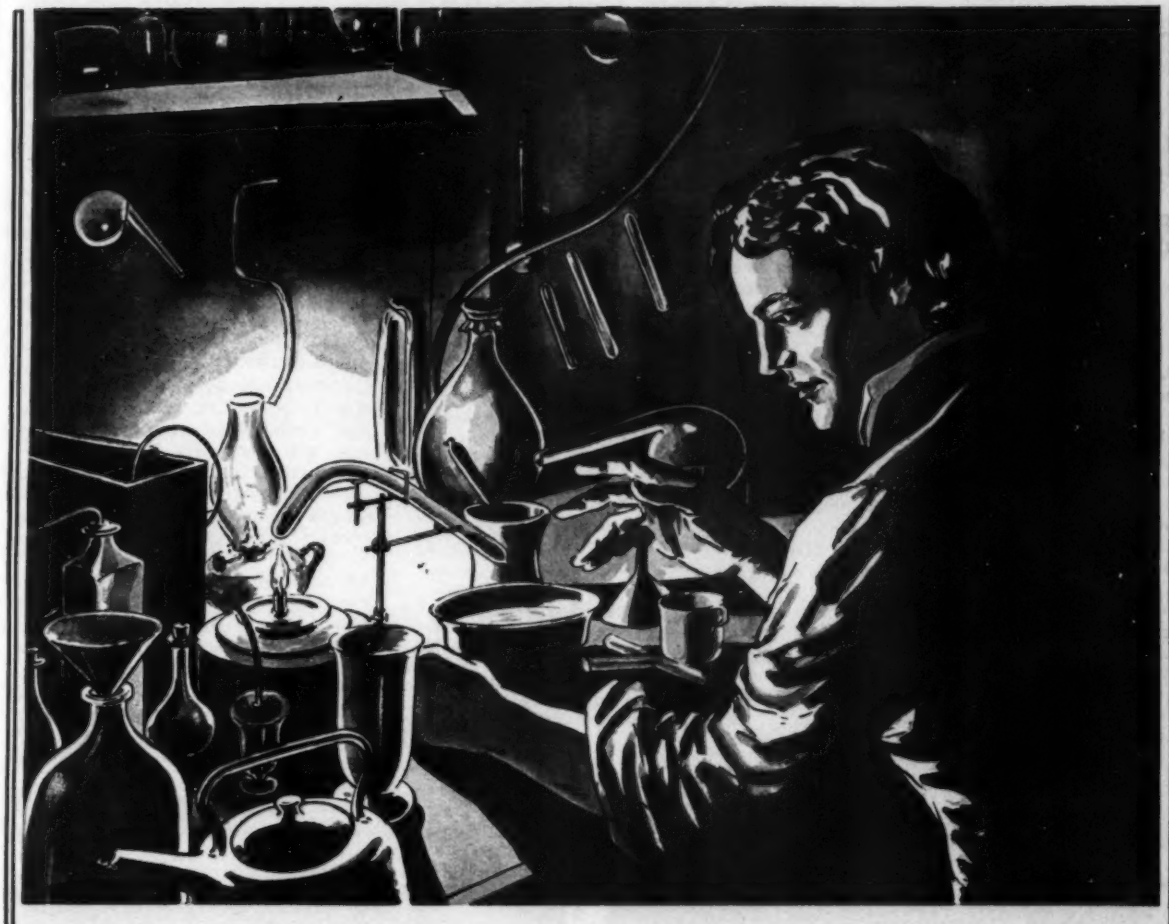


Lindsay WIRES
FOR PAPER MILLS



It was in 1823 that the brilliant young English chemist and physicist, Michael Faraday, working at the Royal Institution under Sir H. Davy, succeeded in liquefying chlorine. In the short limb of a bent test tube he placed a compound which liberated chlorine. The tube was then hermetically sealed and the substance heated. Then by cooling the long limb of the tube a yellow liquid collected which was liquid chlorine. Strangely enough chlorine is manufactured today by the application of another of Faraday's great discoveries, in the realm of electricity. Faraday also produced several new kinds of optical glass, and all in all, his discoveries were of first magnitude in value to modern industry.

Through The Centuries With Alkalies

There may be no "style angle" to the products of this Corporation, but it has become the fashion of discriminating buyers to specify COLUMBIA. This insurance of product quality and uniformity; of prompt and intelligent service; of modern, trouble-free packaging, so vitally important in the handling of liquid chlorine, is alone responsible for COLUMBIA's commanding position in the alkali industry. In buying soda ash, caustic soda, or liquid chlorine it pays to be "label conscious". Specify COLUMBIA.

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The following abstracts are of papers presented at the meeting of the Division of Cellulose Chemistry of the American Chemical Society, September 5-9, 1938, Milwaukee, Wisconsin.

Cation Exchange in Cellulosic Materials

D. A. McLEAN and L. A. WOOTEN.
Bell Telephone Laboratories.
New York, N. Y.

The results of experiments on cation exchange in cellulosic materials, particularly kraft and linen condenser tissues, are presented and discussed in this paper. The methods used in this study were (1) the colorimetric determination of the reduction of acidity of a dilute acid treated with the cellulosic material and (2) the potentiometric titration of a pulped sample with acid or alkali. Water-softening by properly activated jute is demonstrated as an example of exchange reactions. Potentiometric methods were used to prove that there is no anion exchange comparable in magnitude with the cation exchange. The cation exchange reactions are shown to be reversible and independent of the particular anion present.

In a general way, the exchange capacity is higher the greater the β- and γ-cellulose content. It is suggested that the pentosans play an important part in exchange reactions.

The role of exchange reactions in determining the ash content of insulating papers is pointed out. A discussion is given of the importance of exchange reactions in analytical measurements on cellulosic materials.

Effect of Various Pre-Extractions on the Lignin Determination of Wood

ELWIN E. HARRIS and R. L. MITCHELL.
Forest Products Lab., Forest Service

Lignin was removed from wood (under certain conditions as much as 25 per cent of the lignin) when it was extracted with dilute acids, salts, or bases. Such pretreatments should, therefore, be avoided if an accurate determination of the lignin content of a sample is desired.

The Reaction Between Thioglycolic Acid and Spruce Lignin

C. E. AHLM and F. E. BRAUNS.
Institute of Paper Chemistry

According to Holmberg (Svensk Pappers Tidn., 39, Special No., 113-4, 117-8 (1936)) the mechanism of the reaction between thioglycolic acid and lignin is identical to that between sulphurous acid and lignin; in both cases the acid reacts with a hydroxyl group of the lignin with elimination of water. Hägglund and Carlsson (Biochem. Z., 257, 467-477 (1933)), on the other hand, claim that in the sulphite cooking process a new hydroxyl group is formed with the entrance of each sulphonic group, and Freudenberg (Ber., 70, 500-514 (1937)) believes that the new hydroxyl group is phenolic in character. To clear up these contradictions, thioglycolic acid spruce lignin has been investigated.

The results show that lignin (basis of molecular weight, about 860) reacts with four thioglycolic acid groups to give tetrathioglycolic acid lignin with 11.7 per cent methoxyl and 10.1 per cent sulphur. Diazomethane methylation increases the methoxyl content to 24.2 per cent, which on mild saponification decreases to 18.5 per cent with simultaneous removal of two thioglycolic acid groups. On methylation with dimethylsulfate and sodium hydroxide, thioglycolic acid lignin loses three thioglycolic acid groups, giving a methylated monothioglycolic acid lignin with a methoxyl content of 30.4 per cent, which with diazomethane increases to 32.5 per cent. Phenol, with a trace of hydrochrolic acid, gives with tetrathioglycolic acid lignin an ether-insoluble phenol theoglycolic acid lignin with 10.2 per cent methoxyl and an ether soluble with 8.5 per cent methoxyl with simultaneous splitting of some thioglycolic acid groups.

The results indicate that in the reaction of the thioglycolic acid with spruce lignin no new hydroxyl group is formed nor has one disappeared.

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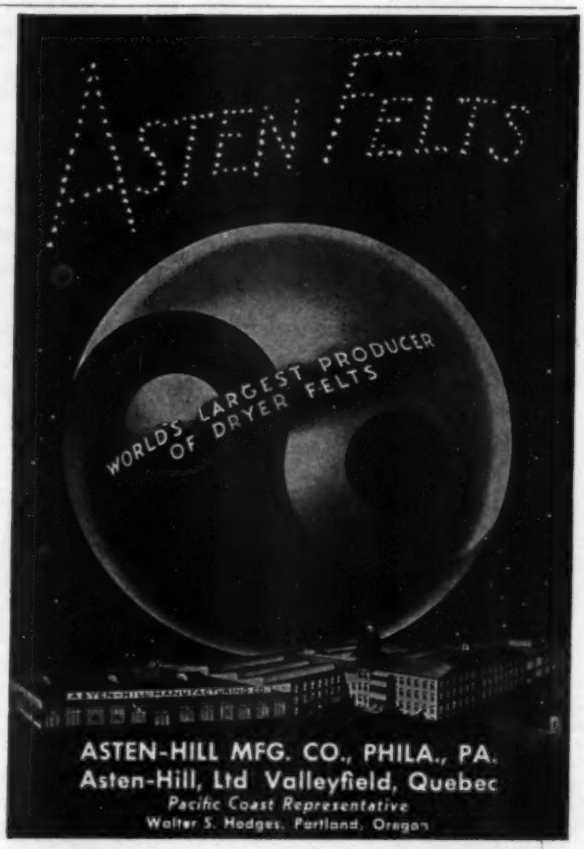
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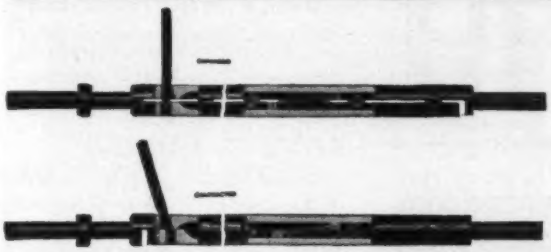

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Write for descriptive folder on any Murray Paper Mill, Pulp Mill, or Wood Room Equipment in which you are interested.

Shown here in both expanded and contracted positions, Murray Collapsible Winder Shafts are easily inserted or removed from the rolls—no sticking or breaking of shafts. Designed to operate freely, they are accurately machined for smoothness and ease of operation . . . will stand abuse and give maximum service . . . made to individual paper machine specifications, to meet individual conditions and in all diameters for any size and width of roll desired. Send us your specifications for quotations.

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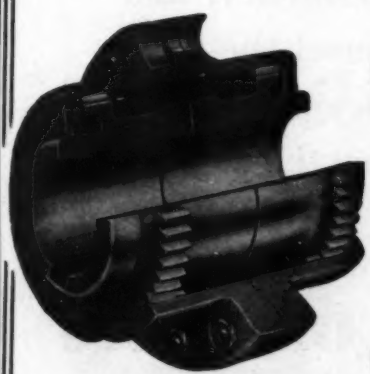

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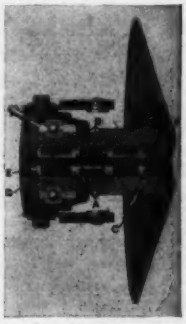
Q. Can we depend upon the Lewellen Lubrication System?

A. (Note: This question is answered in the words of engineers and superintendents using Lewellen Variable Speed Control). **"Only the failure of the oiler to perform his duty can result in trouble from the Lewellen Lubrication System." "We like its simplicity. There is only one Alemite connection to lubricate the disc hub, keys and shafts." "After a thorough inspection, we installed Lewellen Transmissions because we were sold completely on the Lewellen Lubrication System."**

THE LEWELLEN SYSTEM OF POSITIVE LUBRICATION



In the bore of the disc hub is a series of lubricant grooves "A" connected by channels "B" on alternate sides of the key, making one continuous lubricant channel. Grease enters at Alemite connection "C," and is forced through this groove around the shaft to the first channel which carries the grease to the second annular groove. Again it passes around the shaft to the next channel which is at the opposite side of the key. This process is continued until the grease has passed around all the grooves, finally reaching the space at "D" where it again passes around the shaft and out at hole "E."

These annular grooves are so spaced that only a small movement of the disc upon the shaft is necessary in order to completely lubricate the disc and the shaft. When an operator applies his grease gun at "C," he knows when fresh grease appears at "E" that he has cleared the passage of all dirt and old grease and completely filled it with fresh lubricant for there are **NO DEAD ENDS OR AIR POCKETS.** The port "E" also serves another purpose. It relieves the grease channel from the built-up pressure from the grease gun, hence the grease is not forced out between the disc hub and shaft on the face of the disc and upon the belt.

The question of proper lubrication of a variable speed transmission is of paramount importance. The patented Lewellen Lubrication System for disc hubs, keys and shafts is simple, positive and highly efficient. There are no oil pipes, hose or tubes to become loose or to interfere with the accessibility of the working parts of the transmission. The entire transmission may be lubricated without removing the cover of the enclosed type or without stopping operation. With a minimum amount of attention sticking or "freezing" is impossible, thus eliminating expensive repairs and replacements.

In addition there are other exclusive Lewellen features that ***mean years of trouble-free service.*** The famous ***double-block belt*** and ***unbreakable belt splice;*** a ***flexible bearing suspension*** that is self-aligning in every direction; the mounting of ***thrust bearings*** at the outer end of the disc hub. The bearing housing is bolted to the disc hub. When the lever moves outwardly, it moves the disc positively and does not require the belt to force discs apart.

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Variable Speed
TRANSMISSIONS

POTPOURRI

LADIES, . . . PAPER HATS ARE CHIC

Although it is true that fashion notes really have no place in these columns and while it is a bit late, at this date, to publish anything like "style hints for the summer," the office force of THE PAPER INDUSTRY and PAPER WORLD was recently taken by the ingenuity shown by one of its young ladies in the creation of summer millinery made of paper. The young lady and her self-made hats are shown in the accompanying photograph.

The crepe paper used and the original idea of making these hats are credited to the Dennison Manufacturing Company, which firm has long sponsored newer uses for paper. In making these hats the paper was first cut into about 8 strips, each 1¼ inches wide. The strips were then twisted and woven, basket-fashion, with the aid of a small device purchased at the Dennison store, to form the brim of the hat.

In the white, crownless model, ribbons alone are the sole accessory to the twisted paper. In the black model, a bit of chiffon forms the crown and streamers. Both models, it is understood, are considered *tres chic* and both, it may be added, were produced at the total cost of about one dollar, proving that it is quite possible, through the use of paper, to be economical and stylish at one and the same time.

◆

ANNUAL POWER SHOW IN NEW YORK

The Thirteenth National Exposition of Power and Mechanical Engineering will be held December 5-10 at the Grand Central Palace, New York City. Over 40,000 registered visitors are expected this year. Exhibitors are already planning comprehensive and informative product exhibits.

The many operating displays that are now being prepared emphasize the manufacturers' desire to make graphic the construction and actual performance of their products. Included among the many interesting exhibits will be: a valve that separates water and solids from steam and compressed air as they flow through a self-contained separating unit inside the valve; a cross-sectionalized working model of a gas pressure regulator; a new, streamlined, center spring, single gasket joint; a fully automatic saw.

The Power Show is, as heretofore, under the management of the International Exposition Company. Charles F. Roth, president, will again be personally in charge.

THE DRAPER FELT

Unexcelled for strength, openness, resiliency, and general running qualities. Made to meet the most exacting conditions on all types of machines and all kinds of papers. Only one grade and that the highest.

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DRAPER BROTHERS COMPANY

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Woolen Manufacturers Since 1856

REPRESENTATIVES

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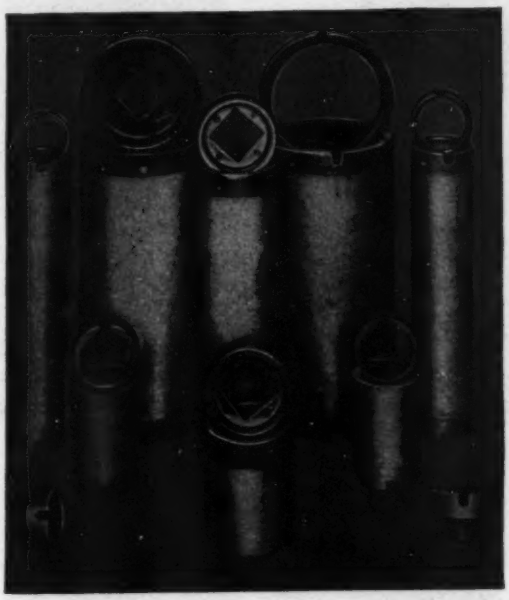

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CAPS — Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with re-enforced square hole. This patented feature of re-enforcement gives added strength and durability.

CORES

Samples of caps or cores will be gladly submitted.

ELIXMAN PAPER CORE COMPANY, Inc.
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wires are **GOOD**

MONO-PLANE WEAVE
PHOSALOY WIRES
APP-WELD JOINT

WIRES

APPLETON WIRE WORKS. INC.
APPLETON, WISCONSIN

LEFT—A. T. Brainerd of the Ciba Company; J. C. Marrone; R. J. Grainer of the Milwaukee Steel Foundry Company; C. Braatz of Marathon Paper Mills; F. R. Forrest of the Wausau Paper Mills Company, and E. G. Artz of E. G. Artz, Inc. RIGHT—J. A. Extrom, chief chemist, Tomahawk Paper Company; R. D. Totten, Ciba Company; H. D. Eliason of Johaneson, Wales and Sparre, and C. E. Stoke, Tomahawk Paper Company.

ABOVE— F. W. Boyce of D. J. Murray Mfg. Co. LEFT—Charles R. Seaborne, general superintendent of Thilmany Pulp and Paper Company and C. E. Saecker of the Appleton Machine Company.

Chinese Paper Makers Hold Jamboree

APPROXIMATELY forty loyal members of the Ancient Order of Chinese Paper Makers attended the annual jamboree at the Trout Lake (Wis.) Golf Course, on August 20 and, it was learned, had a "velly, velly" good time.

Golf was the main order of the day for these loyal Chinese, and scores were unusually high, due, it must be said, to the velocity of the wind and the severe hazards and obstacles on the course. Low gross of the day was shot by Clayton Braatz, of Marathon Paper Mills, with a score of 89. Fred (Confucius) Boyce, of D. J. Murray Mfg. Company, was the toastmaster of the affair. He read telegrams from several members who were unable to be present. After a short talk by Cash Whipple, of Beloit Iron Works, and a number of songs, led by H. F. Weber, of the Link-Belt Company, the session was adjourned.

Prize winners in the golf match, in addition to Mr. Braatz, included R. D. Totten, of the Ciba Company, A. T. Brainerd, of the Ciba Company, and J. A. Extrom, chief chemist, Tomahawk Paper Company. In addition to the championship cup and prizes given by the association, prizes were donated by Mr. Brainerd and E. G. Artz, of E. G. Artz, Inc.

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CLOGLESS FOR HI-DENSITY STOCK

CENTRIFUGAL PUMPS FOR ALL PAPER MILL PURPOSES

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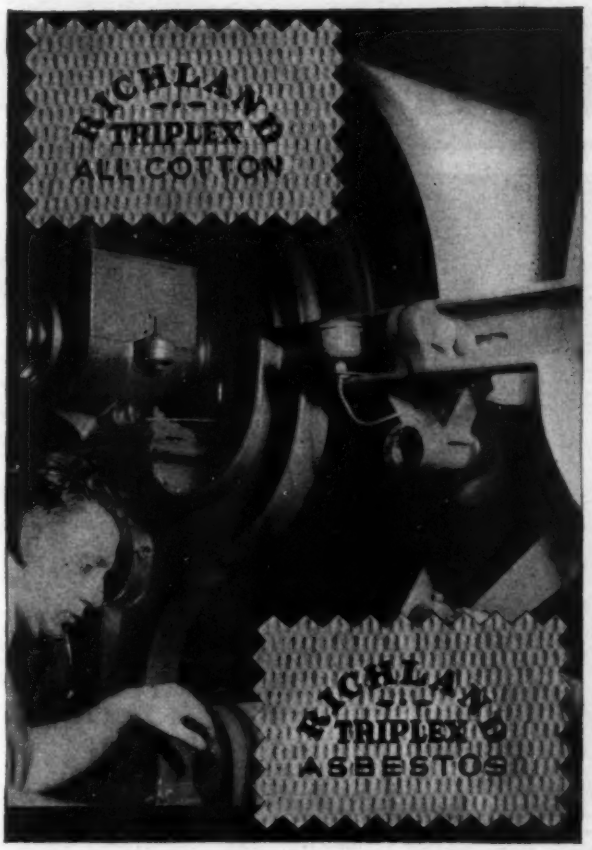

What is YOUR Dryer Felt Cost Equation?...

Many factors enter the dryer felt cost equation. Speed, steam pressures, life, and original cost, are only a few of them. No matter what your operating conditions are, RICHLAND TRIPLEX all cotton or asbestos dryer felts offer certain definite advantages. They are uniform and quick drying. Shrinkage and stretch has been reduced to a minimum requiring fewer stops, less adjustments. They are designed for long life. They are really precision fabrics. Specify them. They make fine paper and are likely to have an important bearing upon your mill's dryer felt cost equation.

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40 WORTH STREET *Selling Agents* NEW YORK CITY
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AN EASY WAY TO CUT PIPING COSTS

Armco shop-fabrication saves up to 25%, simplifies erection, lessens chances for joint leakage.

Why continue to design piping "the hard way," when Armco can spare you all that trouble and expense? Just mail your drawings and specifications and let us fabricate the complete layout to fit your individual requirements.

This way you'll eliminate unnecessary joints, save time and labor in erection, and simplify the problem of maintenance. You'll also find Armco custom-built piping much easier to support or hang than assemblies with greater weight and a greater number of joints. Besides, the smooth interior and streamlined design of Armco piping help increase flow capacity.

Mail your specifications today for pipe diameters from 6 to 36 inches; wall thicknesses from 12 gage to ½-inch. Specify either ARMCO Ingot Iron or steel with your preferred coating, including galvanized after fabrication. The American Rolling Mill Co., Pipe Sales Division, 3271 Curtis St., Middletown, O.

ARMCO

ARMCO SPIRAL WELDED PIPE

PERSONALS

Over six hundred employees of the Crown Zellerbach Corporation and affiliated companies were the guests of the organization at a dinner in honor of I. Zellerbach who recently completed fifty years of service with the company. Mr. Zellerbach, formerly president of the organization, now chairman of the executive committee, is shown shaking hands with A. B. Martin (left) executive vice-president, after presentation of a 50-year pin.

C. E. KINNE NOW PRESIDENT OF BAGLEY & SEWALL

Clarence E. Kinne, vice-president of the Bagley and Sewall Company, was recently elected president of the company to succeed Charles W. Valentine who has resigned.

Mr. Kinne first became connected with the Bagley and Sewall Company in 1893 as a draughtsman, later becoming head of the department. In 1898 he was made chief engineer of the company and in 1913 he was elected secretary and a director. After the death of Mr. Lansing, formerly president of the firm, Mr. Kinne was made a vice-president.

On April 1, 1933 Mr. Kinne retired from active service but was re-elected vice-president in 1934. Edward S. Lansing has been a co-vice-president and will now be the only vice-president as a new one will not be chosen to succeed Mr. Kinne.

◆

D. G. MOON TO DIRECT SPRING PAPER FESTIVAL

Newly-elected director of the forthcoming Paper Festival, to be held next spring in Savannah, Georgia, is D. G. Moon, well known in the paper industry.

Mr. Moon, whose successful man-

HOW YOU CAN IMPROVE WATER

There are many ways to improve your process water and thus improve your sheet and eliminate a lot of troubles which come from unsatisfactory water.

Sometimes improvement is made by simply replacing worn out sand and gravel in your filters; other times the job calls for replacement of strainers which have decreased in efficiency through wear. Sometimes the addition of chemical feeders will eliminate the trouble; other times additional filter beds are required to give proper capacity.

The easiest way to solve your water problems is to use Norwood's 40-year experience. Write us.

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A GOOD START AND A GOOD FINISH WITH
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DEPENDABLE WATER FILTERS AND PAPER FINISHING MACHINERY

SKANEATELES FALLS NEW YORK

The Home of

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THAT ASSURE LONG LIFE, SPEED AND FINE FINISH

TRADE MARK

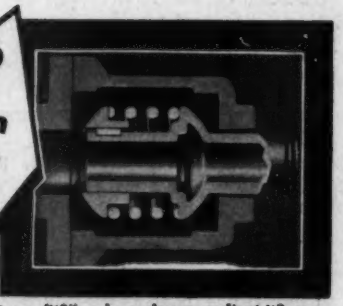
Insist on this trade-mark when buying Felts

SKANEATELES FALLS is known throughout the United States as the home of the superior quality Felts.... Here are workmen whose lives have been devoted to upholding a reputation for furnishing to the paper industry the finest quality Felts it is possible to make.

For speed, long life, dependable service and the finest finish, you need our Felts. Just address—

The Waterbury Felt Co.
SKANEATELES FALLS, N. Y.

What?
. . . a steam fit with the trouble left out?



HOW do you *oil* this "steam fit?" — how do you *adjust* it? . . . how do you re-pack it? The answer is that you don't do any of these things. Those two carbon-graphite rings totally eliminate packing. Their self lubricating quality eliminates oiling. The pressure within the housing causes a pressure-seal effect; so it is self adjusting.

Equally important is the ball-and-socket effect which compensates for angular misalignment of the roll or piping and the annular space between the outlet and the housing which compensates for lateral misalignment. Such a joint will outlast the ordinary packed "steam fit" many times over and save steam, power and time throughout its long service.

Hundreds of these joints have replaced the old style "steam fits" on paper machines, and their remarkable record will be your final reason for adopting them. The wide range of standard and special types meet every requirement of paper machines.

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845 Wood Street, Three Rivers, Michigan

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Rotary **PRESSURE JOINT**

Your Stock goes up-

24 HOURS A DAY... *with* WARREN PUMPS

It's easy to see the extra protection you get from stock handling troubles with Warren stock pumps. First, Warren self-cleaning impellers have special vanes which prevent stock from packing behind the impeller and binding the pump. Second, extra large inlets, pioneered by Warren, assure high density stock reaching the impeller. Third, liberal clearances between impeller and case rings assure the long maintenance of operating efficiency, keep down wear, save your power.

In these, and every other detail—stuffing boxes, bearings, shafts—Warren design is *right*. On your next new installation or replacement, install a Warren pump, built to fit the job. Write for bulletin.

WARREN Pumps
Warren Steam Pump Co., Inc., Warren, Mass.

agement of the 1937 Tappi convention in Savannah won him many plaudits, is responsible for the design and construction of several of the large hydroelectric developments and paper mills in Wisconsin and Michigan. He was retained as chief engineer in the development of power plants, pulp, paper and converting mills in the west, Canada and New England. He has been in the South since 1935 and was formerly connected with the Union Bag and Paper Corporation at Savannah. He is now in private practice at Savannah as a consulting engineer to paper and allied industries. Mrs. Moon will aid her husband in directing the festival.

◆

JOHNSON-SMITH OFFICIALS AT WARD PAPER CO.

With the recent re-opening of the Ward Paper Mill, Merrill, Wisconsin, (see Trade Winds) under the presidency of D. C. Everest, vice-president and general manager of the Marathon Paper Mills, Rothschild, Wisconsin, it was also learned that R. C. Johnson and D. B. Smith are now vice-president and secretary-treasurer, respectively.

R. C. Johnson

Mr. Johnson, formerly of the Northwest Paper Company, is vice-president in charge of sales and maintains offices in the Conway Building, Chicago.

Mr. Smith has been connected with the Marathon Paper Mills Company since 1926, and prior to his connection with the Ward Paper Company was manager of the Standards Department.

Walter Garding, formerly chief chemist at Wausau Paper Mills at Brokaw, Wisconsin, is chief chemist at the Ward mill while William Sharpless, formerly with Watab Paper Company and Kimberly-Clark Corporation, is now general superintendent.

D. B. Smith

AMAZING RESULTS with the

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Shorter Settling Time

Greater Capacity

Greater Solids Recovery

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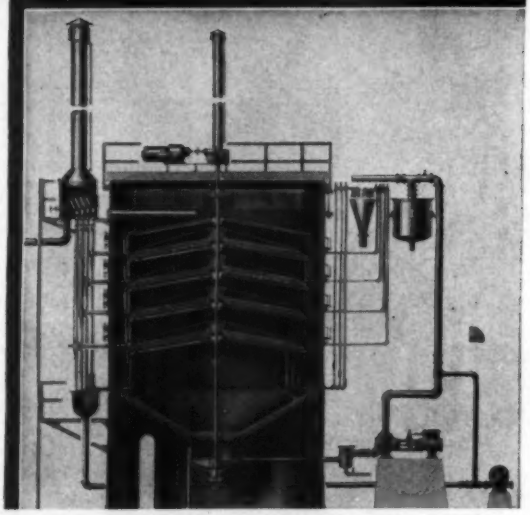
SEIP CLARIFIER



The Seip Clarifier concentrates sludges incident to the recovery operations of soda and sulphite pulp mills and recovers fibers and other suspended solids from paper mill white water.

Based on the principle of *Upward* Filtration, the Seip is at least 14 times as effective as clarifiers where the filtering process is downward.

In old-style settlers, liquid enters through a center downtake, but the Seip intake is located around the tank's periphery, thus providing ten times the intake capacity. This slows down the flow of liquid considerably and minimizes agitation to liquid.

The Seip is made in any desired size. Although furnished complete with leak-proof, welded steel tank, the clarifier mechanism can, in many instances, be installed in present settling tanks and will greatly improve capacity and efficiency.

Made by the Graver Organization, who for three-quarters of a century have been leaders in the manufacture of metal tanks for all purposes, water treating equipment, water softeners, filters and sterilizers, kilns, swim pool systems, etc.

Consult them about your clarifying problems and send for complete data about the Seip.

GRAVER TANK & MFG. CO., INC.

75 Years of Dependable Service

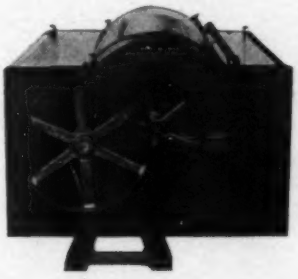
New York, N.Y. East Chicago, Ind. Chicago, Ill. Catasauqua, Pa.

The A. D. Wood Machine

PULP THICKENER — WASHER — SAVEALL
and WATER SCREEN

No Couch Roll or Doctor. Handles variable flows and consistencies. Equipped with patented Double Sealing Collars. Rubber covered or stainless steel construction. Efficient, economical and practically automatic.

Over 30 installed in 1937.



GLENS FALLS MACHINE WORKS, Inc.
GLENS FALLS, N. Y.

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AUTOMATIC MICROMETER

Correct to Half-Thousandth of an Inch Caliper

Desk Model .200 around 6 inch diameter dial. Maximum thickness—325 points. This Cady Desk Model Micrometer is now produced in both 1/1000 inch, also the half-thousandths of an inch. Write us for information.

E. J. Cady & Co.
549 W. WASHINGTON BLVD. CHICAGO

"NON-USERS ARE THE LOSERS"

FINISH AND TRIM

TENAX FELTS

GREETINGS *to* TAPPI

In keeping with our pledge to give satisfaction at all times, subject to constant study and improvement; we will continue to cooperate with the paper manufacturers and their technicians, in solving current problems and in striving for perfection.

"Non-Users Are The Losers"

LOCKPORT FELT COMPANY
NEWFANE, N. Y.—USA

J. ZELLERBACH NOW PRESIDENT

At the organization meeting of the board of directors of the Crown Zellerbach Corporation and on the recommendation of I. Zellerbach, who had been president of the organization since its incorporation, J. D. Zellerbach was elected president of the firm. I. Zellerbach has assumed the office of chairman of the executive committee. R. A. McDonald and H. L. Zellerbach, vice-presidents, were elected executive vice-presidents, and Frank M. Youngman was elected vice-president.

J. D. Zellerbach

Louis A. Colton

In recognition of his having served forty years with Crown Zellerbach, Louis A. Colton, vice-president in charge of purchases of the Zellerbach Paper Company, was recently presented with a diamond studded pin by officials of the company. Mr. Colton has spent practically his entire career in the service of the Crown Zellerbach organization. In addition to his work with the Zellerbach company, Mr. Colton has been president of the San Francisco Advertising Club, president of the Purchasing Agents Association as well as a very active Mason.

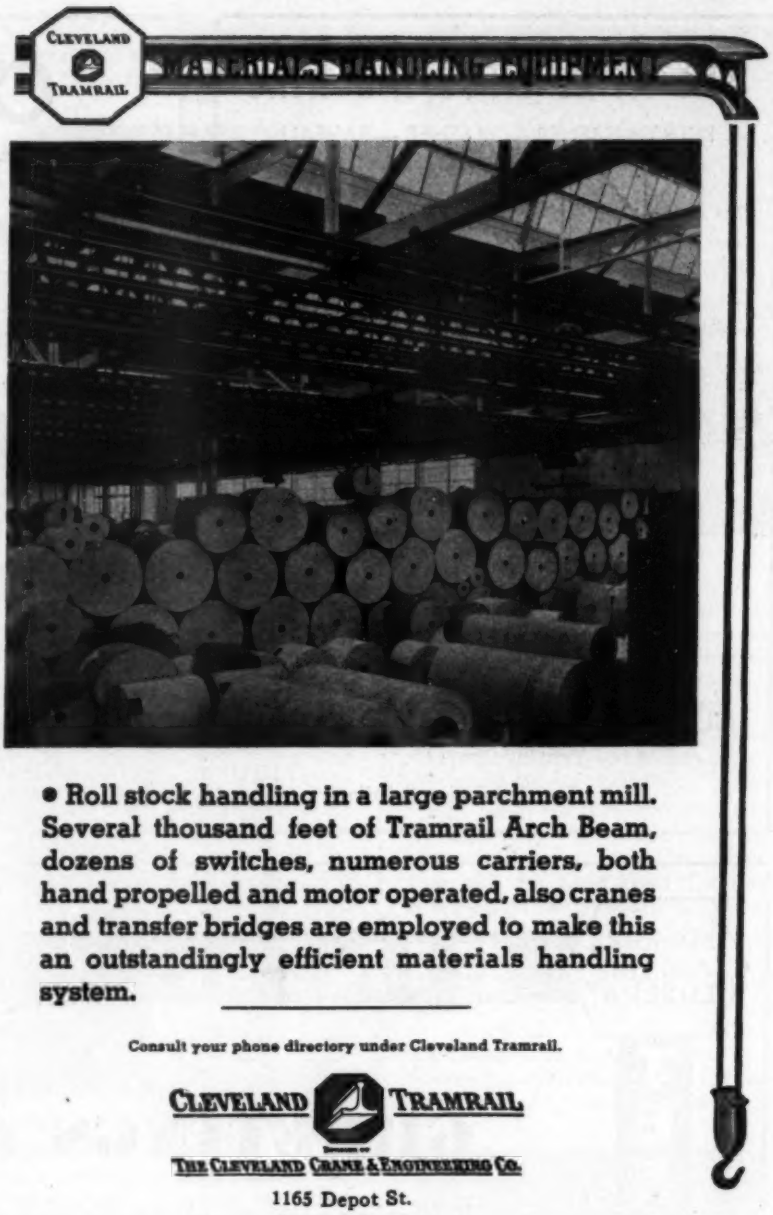
◆

McCORMICK HAS NEW POST WITH M. AND O. CO.

Formerly general superintendent of the groundwood division, St. Regis Paper Company, E. L. McCormick has recently been made assistant general superintendent for the Minnesota and Ontario Paper Company.

Mr. McCormick has had wide experience in the manufacture of paper, starting as early as 1914 as boss machine tender for the Belgo Paper Company in Shawynigan Falls, Quebec. In 1915 he was night superintendent for the Abitibi Power and Paper Company and two years later was located at Cape Madeline as paper mill superintendent for the St. Maurice Paper Company.

This was followed by a rapid succession of advances with various paper



• Roll stock handling in a large parchment mill. Several thousand feet of Tramrail Arch Beam, dozens of switches, numerous carriers, both hand propelled and motor operated, also cranes and transfer bridges are employed to make this an outstandingly efficient materials handling system.

Consult your phone directory under Cleveland Tramrail.

CLEVELAND TRAMRAIL
Division of
THE CLEVELAND CRANE & ENGINEERING CO.
1165 Depot St.
WICKLIFFE, OHIO

THOROUGH CLEANING

Lengthens

FELT LIFE

NOW, by thorough low-cost Oakite cleaning, you can wash away every trace of slime, sizing and dirt, and make your felts soft, absorbent, resilient.

What is more, Oakite cleaning is safe to use. It will not harm felt fibre or impair fibre tensile strength in any way. Felt life is prolonged. Write.

ASK, TOO, FOR DATA ON SLIME REMOVAL

Remove slime, algae growths and bacterial organisms from pipe lines more quickly, more thoroughly with Oakite Slime Remover. Get full information.

Manufactured only by

OAKITE PRODUCTS, INC., 16 Thames St., NEW YORK, N.Y.

Branch Offices and Representatives in All Principal Cities of the U. S.

OAKITE *Certified* CLEANING

MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

LABOR COSTS CUT 60% TO 70% *when* NITROSE *. . . is used*

Nitrose can be applied with only a third the labor ordinarily required. No expensive preparatory work necessary — no second coat needed when you use this time-tested protective covering for metal surfaces. Effectively resists corrosion under severe conditions — offers long-time protection in general maintenance work at no more cost than ordinary paints. Write

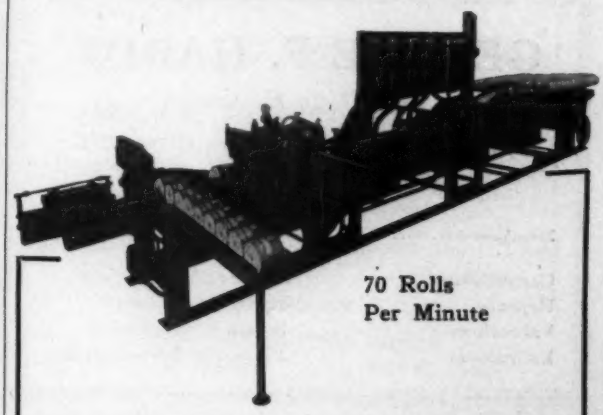
THE NITROSE CO., INC. • PEORIA, ILL.

Since 1830
"That he who cuts may cut well."

The finest knife is none too good for your paper cutters. This means COES MICRO-GROUND.

Loring Coes Company

Worcester, Mass.



70 Rolls Per Minute

WRAPPING MACHINE

A newly designed high speed wrapper that has paid for itself in six months after installation. For toilet rolls, towels, wax paper or any other cylindrical product. Write for folder and illustrations.

Hudson-Sharp Machine Company

Green Bay, Wis.

companies until 1924 when Mr. McCormick became general superintendent at the St. Regis firm, a position he held until his resignation March 1, 1938. His experience in developing groundwood papers covers a wide range of grades such as directory, rotogravure, magazine book and converting paper.

E. L. McCormick

◆

LAWRENCE HEADS BRYANT PAPER CO.

William J. Lawrence, formerly general manager of the Paper Makers Chemical Division of the Hercules Powder Company at Kalamazoo, Michigan, has been elected to the presidency of the Bryant Paper Company, Kalamazoo, succeeding William T. Schmitt who resigned recently.

Mr. Lawrence, a member of the Bryant board of directors and a well-known Kalamazoo valley paper financier and executive, entered the paper chemical business as a youth and in 1911 became an executive of the Paper Makers Chemical Company in Easton, Pa., eventually becoming president and general manager of the firm. He remained as general manager of the Kalamazoo division after a merger with the Hercules Powder Company. Mr. Lawrence is also a director of the Kalamazoo Vegetable Parchment Com-

COMING EVENTS

Sept. 16-17—American Pulp and Paper Mill Superintendents Association, Northeastern Division Meeting, Poland Spring Hotel, Poland Spring, Me.
Sept. 19-23—Seventh International Management Congress, Washington, D. C.
Sept. 21-23—National Industrial Advertisers Association, 16th Annual Conference, Hotel Statler, Cleveland, Ohio.
Sept. 23-24—American Pulp and Paper Mill Superintendents Association, New York-Canadian Division Meeting, Lake Placid Club, Lake Placid, N. Y.
Oct. 4—Technical Association of the Pulp and Paper Industry, Pacific Section Meeting, Portland, Ore.
Oct. 7-8—American Pulp and Paper Mill Superintendents Association, Pennsylvania-New Jersey-Delaware Division Meeting, Benjamin Franklin Hotel, Philadelphia, Pa.
Oct. 10-14—National Safety Congress, Stevens Hotel, Chicago, Ill.

GREAT BRITAIN

T. Rasmussen & Co., Ltd., 7 Broadway, London, E.C. 4, wish to get in touch with U. S. paper and board mills who are interested in export to England and British Empire. Please send them samples and state whether you are prepared to arrange selling agency with them.

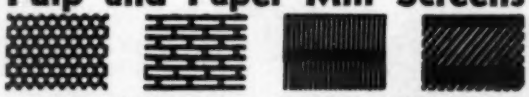
It Pays to Read the Advertising in
THE PAPER INDUSTRY and PAPER WORLD

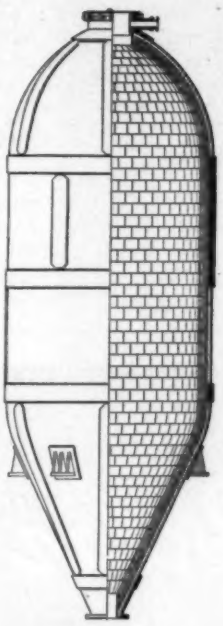
GEORGE F. HARDY
Consulting Engineer
305-309 Broadway, New York City, N. Y.
Member—Am. Soc. C. E.—Am. Soc. M. E.—Eng. Inst. Can.

Consultation — Paper and Pulp Mills
Reports — Hydro-Electric and
Valuations — Steam Power Plants
Estimates — Plans and Specifications

THE RUST ENGINEERING CO.
CLARK BUILDING
PITTSBURGH, PA.
LINCOLN BLDG. NEW YORK, N. Y.
DISTRICT BANK BLDG. WASHINGTON, D. C.
MARTIN BLDG. BIRMINGHAM, ALA.
6 N. MICHIGAN AVE. CHICAGO, ILL.
SPECIALIZE IN
CONSTRUCTION
COMPLETE PULP AND PAPER MILLS
INDUSTRIAL PLANTS
POWER PLANTS
BRICK AND CONCRETE CHIMNEYS

HARDY S. FERGUSON & COMPANY
CONSULTING ENGINEERS
200 FIFTH AVENUE — NEW YORK CITY
Hardy S. Ferguson—*Member A.S.C.E. A.S.M.E. E.I.C.*
Moses H. Teaze—*Member A.S.C.E. A.S.M.E. E.I.C.*
Consultation, reports, valuations, and complete designs and engineering supervision for the construction and equipment of
PULP AND PAPER MILLS
AND OTHER INDUSTRIAL PLANTS
STEAM AND HYDRO-ELECTRIC
POWER PLANTS
DAMS AND OTHER HYDRAULIC
STRUCTURES

Pulp and Paper Mill Screens

of STAINLESS STEEL—COPPER—BRONZE—
MONEL—CHEMICAL RESISTING ALLOYS
Perforations that are accurate in size and alignment
ANY METAL ANY PERFORATION
The Harrington & King PERFORATING CO.
5654 Fillmore St., Chicago, Ill., ◆114 Liberty St., New York, N.Y.



Digester Linings

THAT

PAY FOR

THEMSELVES

in

INCREASED LIFE

CLEANER PULP

PROTECTION

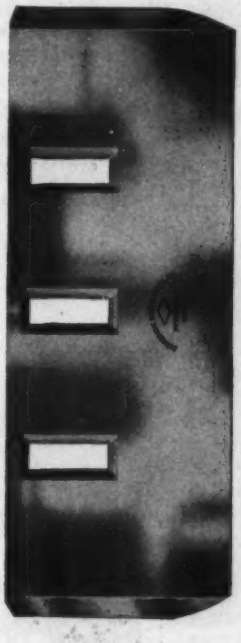
●

CHEMICAL LINING ENGINEERS INC.

832 BUILDERS EXCHANGE MINNEAPOLIS, MINN.

In Canada:

CHEMICAL LINING ENGINEERS LTD., Ft. Frances, Ont.



Produce more

UNIFORM CHIPS

with these

CHIPPER KNIVES

(Made with one or more slots)

Made a superior, tough, edge-holding quality. Write for prices on these Knives or on Paper Cutter Knives, Band Saws or Circular Saws.

SIMONDS SAW AND STEEL CO.

FITCHBURG, MASS.

1350 Columbia Road Boston, Mass. 127 So. Green St. Chicago, Ill. 311 S.W. First Ave. Portland, Ore.

"You Can Take It For Granted"—

SOLVAY

Liquid Chlorine

IS *ALWAYS* STANDARD!

When a Company has maintained the most rigid of production standards over a period of 55 years . . . you can rely upon its name and on its products! Scientific methods . . . exacting supervision have made SOLVAY LIQUID CHLORINE a bleaching agent on which you can depend . . . that you can take for granted will be always pure, always uniform, when you receive it!

And when you place your order with Solvay for LIQUID CHLORINE . . . SODA ASH . . . CAUSTIC SODA . . . you are guaranteed fast, sure, on-time deliveries. You are relieved of worry, of check up . . . time spared for your own problems.

Write for full information and prices. Ask for free copy of 44-page book "SOLVAY LIQUID CHLORINE."

SOLVAY SALES CORPORATION

Alkalies and Chemical Products Manufactured by The Solvay Process Company

40 RECTOR STREET NEW YORK

CHEMIPULP PROCESS INC.

CHEMICAL PULP MILL ENGINEERS

Chemical Pulping Processes ☆ Operating Surveys

Appraisals ☆ Estimates

500 WOOLWORTH BUILDING WATERTOWN, N. Y.

3311 FIRST AVENUE SOUTH SEATTLE, WASH.

Associated with

CHEMIPULP PROCESS LIMITED

403 Crescent Building Montreal, Quebec

NOPCO

"EVOLVED THRU RESEARCH"

FOR BETTER PAPER PRODUCTION

Foam Killers ● Defoamers and Eveners ● Sulphonated Oils
Pitch Emulsifiers ● Penetrants ● Wax Sizes ● Glycerine
Soaps ● Felt Washing Compounds ● Glycerine Substitutes

NATIONAL OIL PRODUCTS CO.

HARRISON, N. J.

BOSTON CHICAGO CEDARTOWN, GA. SAN FRANCISCO

pany, board chairman of the Michigan Paper Company and holds extensive southern forest acreage.

The retiring president, Mr. Schmitt, will return to Detroit to pursue indus-

W. J. Lawrence

trial interests there. He was formerly comptroller of the Chrysler Corporation, an officer of the Murray Corporation and an executive of the American Writing Paper Company.

Earlier this year another major personnel addition was made at the Bryant Paper Co. when Edward C. Rutz, city manager of Kalamazoo, was made maintenance director of the mill.

◆

E. G. MANSFIELD MADE PRES. OF SAMUEL C. ROGERS

Formerly vice-president and treasurer of Samuel C. Rogers & Company,

E. G. Mansfield

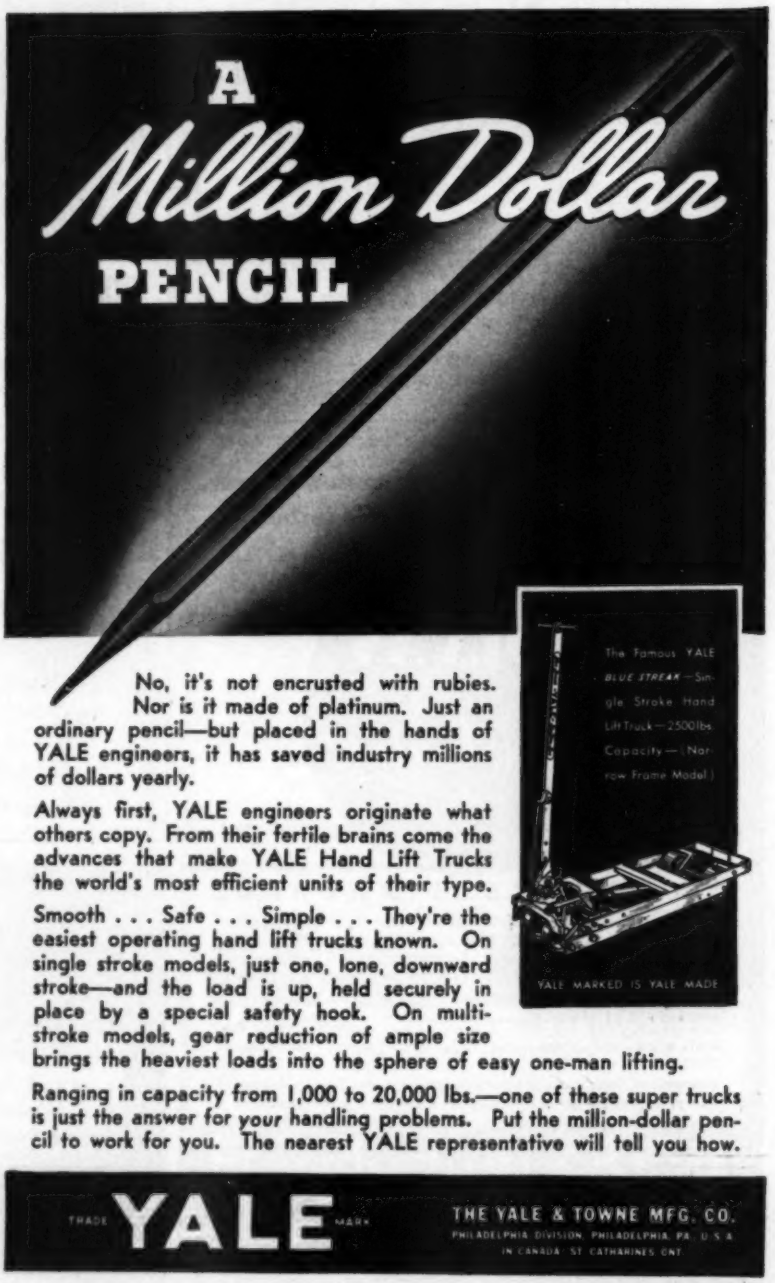
E. G. Mansfield was recently elected president of the firm. Mr. Mansfield has been actively identified with the Samuel C. Rogers & Company for 25 years. He succeeds Oliver Cabana, Jr., who passed away early this year.

◆

H. STAFFORD RETIRES FROM HAWTHORNE CO.

After a half century devoted to the manufacture of paper, Homer Stafford, superintendent of the Hawthorne Paper Company, Kalamazoo, retired September 1.

When Mr. Stafford started as a reel boy in 1887, in the newsprint mill of H. Remington & Sons, Watertown, N. Y., he worked 13 hours every night. His mill career led him to positions in Maine, New Hampshire, Massachusetts and Quebec before he came to the Kalamazoo mill in 1926. Department heads and office workers of the Hawthorne firm gave a complimentary dinner for Mr. Stafford and presented him with a wrist watch in honor of his long years of service.


A
Million Dollar
PENCIL
No, it's not encrusted with rubies. Nor is it made of platinum. Just an ordinary pencil—but placed in the hands of YALE engineers, it has saved industry millions of dollars yearly.
Always first, YALE engineers originate what others copy. From their fertile brains come the advances that make YALE Hand Lift Trucks the world's most efficient units of their type.
Smooth . . . Safe . . . Simple . . . They're the easiest operating hand lift trucks known. On single stroke models, just one, lone, downward stroke—and the load is up, held securely in place by a special safety hook. On multi-stroke models, gear reduction of ample size brings the heaviest loads into the sphere of easy one-man lifting.
The Famous YALE BLUE STREAK—Single Stroke Hand Lift Truck—2500 lbs. Capacity—(Narrow Frame Model)
YALE MARKED IS YALE MADE
Ranging in capacity from 1,000 to 20,000 lbs.—one of these super trucks is just the answer for your handling problems. Put the million-dollar pencil to work for you. The nearest YALE representative will tell you how.
TRADE YALE MARK
THE YALE & TOWNE MFG. CO.
PHILADELPHIA DIVISION, PHILADELPHIA, PA., U.S.A.
IN CANADA: ST. CATHARINES, ONT.

1910 - 1938

and still going strong!

TANNATE BELTS LAST LONGER

• Here's a 28" Rhoads TANNATE Leather Belt bought by a southern paper mill in 1910 and in continuous operation ever since—now driving Wood Room machinery from a 300 hp motor at 5510 f. p. m.! Figure out the millions of miles this belt has traveled and you'll appreciate what TANNATE'S rugged stamina will do for you, too, in cutting your production and maintenance costs. Write NOW for details.

J. E. RHOADS & SONS

Established 1702

Philadelphia, 35 N. Sixth St.

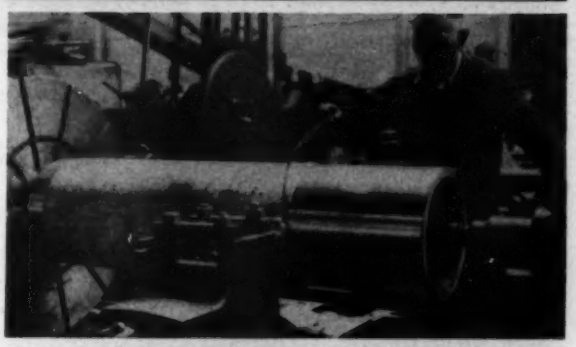
New York Chicago Atlanta Cleveland

Factory and Tannery, Wilmington, Del.

5
RHOADS
TANNATE
ECONOMY FACTORS
To Increase Your Profits
Per Unit of Production
1 GREATER PRODUCTION . . .
—through maximum power transmission capacity even under heavy load.
2 HIGHER QUALITY OF OUTPUT
—through steady flow of power under varying condition of load.
3 LOWER REPLACEMENT COSTS
—through longer service-life.
4 LOWER MAINTENANCE COSTS
—through greater resistance to wear.
5 ASSURANCE OF SATISFACTION
—through Rhoads Service Guarantee.

TANNATE LEATHER BELTING — LOWERS COSTS Per Unit of Production

CENTRIFUGALLY CAST



ROLL COVERS—ROLL SHELLS MADE TO MAKE PAPER

by SANDUSKY

SINCE 1910 Sandusky has furnished mills with roll covers of practically every metal except steel. Problems of wear, corrosion, cost, rigidity, strength, smoothness and finish have been solved. New developments have been made. The superiority of Sandusky Centrifugally Cast covers has been firmly established.

Rolls made with Sandusky shells are best because they are seamless, rigid, strong and free from internal strains. They stay round and true. They can be reground indefinitely.

Whether you need a dense, tough Monel Metal shell as illustrated above, or a standard bronze shell; or an inexpensive tube roll . . . it will pay you to specify Sandusky Centrifugally Cast.

Write for Illustrated Bulletin No. 537

Sandusky Cast is PRESSURE CAST

Sandusky Foundry & Machine Company

NECROLOGY

ADAM WILKINSON

For eighteen years labor advisor of the paper manufacturers throughout the Connecticut Valley and for many years labor relations commissioner of the American Writing Paper Corporation, Adam Wilkinson passed away August 19 in Holyoke, Mass., at the age of 55.

Mr. Wilkinson had a notable labor record and was a close personal friend of John L. Lewis and William Green. He was appointed to the United States Labor Board by President Taft and served until the close of the World War. He entered the employ of the American Writing Paper Company in 1920 as labor commissioner under George Galliver, then president of the company. Mr. Galliver and Mr. Wilkinson had served together on the Labor Board in Washington. Mr. Wilkinson retired from AWP last year to open offices as a general labor advisor.

Surviving Mr. Wilkinson are his widow, two daughters and a sister.

Adam Wilkinson

◆

HENRY LAIDLAW

Widely known in the pumping machinery world, Henry Laidlaw, formerly sales manager of the Worthington Pump and Machinery Corporation, passed away recently at the age of 78.

Mr. Laidlaw was born in Scotland in 1860 and came to the United States in 1880. In 1887 he joined his brother, Walter Laidlaw, who was one of the founders of the Laidlaw-Dunn-Gordon Air Compressor Company, and became the first salesman for the new company. When the International Steam Pump Company was founded in 1898, of which the Laidlaw-Dunn-Gordon firm was a member, he became sales manager of the company's Detroit office and also for the Worthington Pump and Machinery Corporation, its successor. Mr. Laidlaw is survived by three sons.

◆

▶▶▶ Owner of the Paper Ruling Company, Springfield, Mass., *William G. Ryan* passed away August 11 in Holyoke, Mass., after a brief illness. Mr. Ryan learned the paper ruling business in the old Nonotuck No. 2 Paper Mill before it became a part of the American Writing Paper Corp.

◆

H. W. BUTTERWORTH

Harry W. Butterworth, Sr., president until 1929 and later chairman of the board of directors of H. W. Butterworth & Sons Company, Philadelphia, pioneer makers of textile finishing machinery, passed away August 3 at Rydal, Pa. He would have been 75 years of age August 8.

Credited with being the father of the finishing industry in the South, Mr. Butterworth was the first man in his line to actively cultivate the South with the idea of having the mills do their own dyeing, bleaching and finishing.

Mr. Butterworth was born in 1863, the son of James Butterworth, then president of the company, and became identified with the business in 1882. In 1889 he was secretary, and became president in 1907.

Prior to his living in Florida for the last several years, Mr. Butterworth had been a member of the Union League and was a director of the Fire Association of Philadelphia. At his death he was a member of the Huntingdon Valley Country Club.

Surviving Mr. Butterworth are his widow, three sons and two daughters, in addition to a brother and a sister.

Harry W. Butterworth

CLAYS

IMPORTED

PAPER MAKERS IMPORTING CO. INC. EASTON, PENNSYLVANIA, U.S.A.

DOMESTIC

DOMESTIC—TALC AND WHITING

729,290 Tons Annually (2,330 Tons Daily) of Southern Kraft Pulp

Screened clean by 22 APMEW knotters (Each 105 tons daily driven by ONE H.P. Motor) and 28 APMEW Screens (First Screens each handling 105 tons daily using 35 H.P.) in new Kraft Mills of the South.

CLEAN PULP IS BEING PRODUCED—WITH GREAT EFFICIENCY by Centrifugal Separation Principle and Inward Flow Screening.

TEN CENTS per ton pays for these 22 APMEW Knotters and 28 APMEW Screens in one year. SAVINGS in power, labor, maintenance, repairs, etc.; usually repay the investment in less than one year, and thereafter makes good earnings.

AMERICAN PAPER MACHINERY & ENGINEERING WORKS, Inc.

GLENS FALLS, NEW YORK

Roots CONNERSVILLE

VACUUM PUMPS

assure STEADY SUCTION

3 Plus a way saving

8 MODERATE INVESTMENT

88 LOW POWER REQUIREMENT

888 NEGLIGIBLE MAINTENANCE

ROOTS-CONNERSVILLE BLOWER CORPORATION

CONNERSVILLE, INDIANA

Weaving cloth for a suit of clothes is child's play compared to the manufacture of felts to clothe a paper machine. The little flaw that would pass unnoticed in the suit would utterly wreck a felt.

Felt making requires modern facilities and skilled workmanship. If you would like to see the way it is done . . . the way Orr does it . . . pay us a visit. We'll be glad to take you through our plant, which is the most complete, the most modern, and the largest paper mill felting plant in the world.

Therein lies the explanation of Orr Felt success on paper machines of every type, making every grade known, both here and abroad.

Call our nearest representative. He can be of assistance.

THE ORR FELT AND BLANKET CO.

Piqua, Ohio

CURRENT MARKET QUOTATIONS

RAGS (Domestic)
f. o. b. New York City

NEW RAGS — per cwt.

Blue Overalls	4.75 to 5.00
Corduroy	2.25 to 2.50
Cottons—	
Washables, No. 1	1.65 to 1.80
Fancy Percales	3.00 to 3.25
New Soft Blacks	3.00 to 3.25
New Light Seconds	1.60 to 1.75
New Dark Seconds	1.50 to 1.60
Khaki Cuttings—	
Mixed	3.25 to 3.50
O. D.	3.75 to 4.00
New Canvas	7.00 to 7.50
New Mixed Blacks	2.50 to 2.75
Shirt Cuttings—	
New White No. 1	6.50 to 6.75
Silesias No. 1	3.75 to 4.00
New Unbleached	6.25 to 6.50
Fancy	2.25 to 2.50

RAGS (Domestic)
f. o. b. New York City

OLD RAGS

	per cwt.
Roofing—	
No. 1	1.05 to 1.10
No. 2	.85 to .90
No. 3	.75 to .80
Twos and Blues—	
Repacked	1.50 to 1.60
Thirds and Blues—	
Repacked	1.30 to 1.40
Miscellaneous	1.05 to 1.15
White, No. 1—	
Repacked	3.50 to 3.75
Miscellaneous	2.75 to 3.00
White, No. 2—	
Repacked	2.25 to 2.50
Miscellaneous	1.75 to 2.00

RAGS (Foreign)
ex dock New York City

NEW RAGS — per cwt.

New Dark Cuttings	2.25 to 2.50
New Mixed Cuttings	2.00 to 2.25
New Light Silesias	4.25 to 4.50
Light Flannelettes	4.50 to 4.75
Unbleached Cuttings	6.50 to 6.75
New White Cuttings	7.00 to 7.25
New Light Oxfords	3.50 to 3.75
New Light Prints	3.00 to 3.25

RAGS (Foreign)
ex dock New York City

OLD RAGS — per cwt.

No. 1 White Linens	7.00 to 7.25
No. 2 White Linens	6.00 to 6.25
No. 3 White Linens	4.75 to 5.00
No. 4 White Linens	3.50 to 3.75
No. 1 White Cottons	4.00 to 4.25
No. 2 White Cottons	3.25 to 3.50
No. 3 White Cottons	2.50 to 2.75
No. 4 White Cottons	2.00 to 2.25
Extra Light Prints	2.50 to 2.75
Ord. Light Prints	2.00 to 2.25
Med. Light Prints	1.75 to 2.00
Dutch Blue Cottons	2.00 to 2.25
French Blue Cottons	2.10 to 2.30
French Blue Linens	2.75 to 3.00
Checks and Blues	1.75 to 2.00
Linsey Garments	1.50 to 1.60
Dark Cottons	1.15 to 1.25
Old Shopperies	1.00 to 1.05

ROPE and BAGGING
f. o. b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	2.25 to 2.35
Domestic	2.10 to 2.20
Wool Tares—	
Light	1.70 to 1.80
Heavy	1.90 to 2.00
Bright Bagging	1.50 to 1.60
Manila Rope—	
Foreign	2.50 to 2.75
Domestic	2.50 to 2.75
New Burlap Cuttings	2.25 to 2.40
Jute Threads—	
Foreign	2.75 to 3.00
Domestic	3.00 to 3.25
Strings—	
Sisal	1.50 to 1.60
Soft jute	1.75 to 1.85
Mixed	.50 to .60

WASTE PAPER
f. o. b. New York City

	per cwt.
Shavings—	
White Envp. Cuttings	2.40 to 2.50
Ord. Hard White No. 1	1.75 to 2.00
Ord. Soft White No. 1	1.65 to 1.75
Flat Stock—	
Stitchless	.75 to .80
Overissue Mags	.65 to .70
Solid Flat Book	.55 to .60
Crumpled No. 1	.50 to .55
Solid Ledger Books	1.40 to 1.50
Ledger Stock—	
White	1.15 to 1.25
Colored	.70 to .80
New B. B. Chips	.20 to .22½
Manilas—	
New Env. Cuts	1.50 to 1.60
New Cuttings	1.30 to 1.40
Bogus Wrappers	.20 to .22½
No. 1 Old Kraft	.65 to .75
News—	
No. 1 Wh. News Cuttings	1.30 to 1.40
Strictly Overissue	.40 to .45
Strictly Folded	.30 to .35
No. 1 Mixed Paper	.12½ to .17½

CHEMICALS
f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	3.40 -
Ground, cwt.	3.15 -
Powdered, cwt.	3.55 -
Blanc Fixe—	
Bulk, ton	42.50 to 45.00
Barrels, pound	.0350 to .0375
Bleaching Powder—	
Drums, cwt.	2.00 to 2.25
Casein (Domestic Standard)—	
Ground (bags), lb.	9.50 to 10.00
Fine grd. (bags), lb.	10.00 to 10.50
China Clay—	
Domestic Filler	
Bulk (mine) ton	8.50 to 12.00
Domestic Coating	
Bulk (mine) ton	11.00 to 20.00
Imported (ship side)	
Bulk (lump) ton	14.50 to 24.00
Chlorine—	
Tank cars (wks) cwt.	2.15 to 2.55
Gelatine (silicin) lb.	.42 to .44
Glye. (C.P.) drums, lb.	.1425 to .1475
Litharge, bbl., lb.	.07 to .0725
Rosin (Gum)—	
Savannah, 280 lb. barrel	
E, per bbl.	5.60
F, per bbl.	5.77½
G, per bbl.	5.77½
WW, per bbl.	7.80
Rosin (Wood), per bbl., carlots	5.17½
Salt Cake—	
Dom. bulk (wks) ton	12.00 to 13.50
Imp. bulk on dock—	
(Atl. ports) ton	14.50 to 15.00
Soda Ash—	
Bulk (works) cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.30
Barrels, cwt.	1.05 to 1.30
Soda (Caustic)—	
Solid, drums, cwt.	2.30 to 2.40
Ground and flaks, drums, cwt.	2.70 to 2.80
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.00
40 deg., 35 gal. drums, (works) cwt.	.80 to 1.20
Starch—	
Pearl, 140 lb. bags, cwt.	2.45 -
Pearl, barrels, cwt.	2.70 -
Paper (Sp.) bags, cwt.	2.55 -
barrels, cwt.	2.80 -
Sulphur (crude)—	
(mine) bulk, ton	18.00 to 21.00
Talc—	
Dom. 100 lb. bags (mine) ton	14.00 to 18.00
Imp. bulk, ton	25.00 to 40.00
Titanium Dioxide—	
Ba. Pig., bbls., lb.	.05½ to .06½
Ca. Pig., bbls., lb.	.05½ to .06½
Zinc Sulphide, bbls., lb.	.09 to .095

CHEMICAL PULP
(Air-dry ton)

	per cwt.
Soda (Dom.) del'd. mill—	
Bleached	2.55 -
Sulphate (Dom.) f. o. b. mill—	
Bleached	2.75 to 3.00
Kraft No. 1	2.00 to 2.25
Kraft, Southern, del.	1.87½ to 2.00
Sulphate (Imp.) on dock—	
Bleached	2.75 to 3.00
Kraft No. 1	1.70 to 1.90
Kraft No. 2	1.60 to 1.70
Sulphite (Dom. & For.) On dock—	
Prime bleached	2.50 to 2.75
Prime easy bleach	2.25 to 2.50
Prime strong unbl.	1.90 to 2.15

MECHANICAL PULP
(Air-dry ton)

	per ton
No. 1 Dom. & Can. (f. o. b. mill)	19.00 to 22.00
No. 1 Imp. (On dock)—	
Moist	25.00 to 26.00
Dry	24.00 to 25.00

PAPER
f. o. b. New York City

	per ton
Boards—	
Binders	71.00 to 77.00
Chip	27.50 to 30.00
Chip, sgl. mls. lined	42.50 to 45.00
Coated, white patent .016	60.00 to 65.00
.020 and heavier	55.00 to 60.00
Kraft liner	42.50 to 45.00
News	27.50 to 30.00

	per cwt.
Book (cased)—	
No. 1 Glossy Coat	10.80 to 12.25
No. 2 Glossy Coat	9.25 to 10.50
No. 3 Glossy Coat	8.15 to 9.25
No. 4 Glossy Coat	7.65 to 8.75
No. 1 Antique	7.65 to 8.75
No. 2 Offset	7.00 to 8.00
A Grade E. F.	6.80 to 7.75
A Grade Super	7.05 to 8.00
B Grade E. F.	6.25 to 7.25
B Grade Super	6.50 to 7.50
C Grade E. F.	6.00 to 7.00
C Grade Super	6.25 to 7.25
D Grade E. F.	5.70 to 6.75
D Grade Super	5.95 to 7.00
Ivory & India	.50 cwt. extra

	per cwt.
Bonds (Rag Content)—	
100% Rag Ext. No. 1	39.10 to 46.00
100% Rag	31.05 to 36.50
85% Rag	
75% Rag	23.60 to 27.75
65% Rag	20.50 to 25.00
50% Rag	17.55 to 21.50
25% Rag	14.65 to 17.75
Regular Colors	1.00 cwt. extra
Heavy Colors	3.00 cwt. extra

	per cwt.
Bonds (Sulphite)—	
No. 1	8.80 to 10.75
No. 2	7.90 to 9.50
No. 4	7.00 to 8.50
Colors	1.00 cwt. extra
Glassine (f. o. b. mill)—	
Embossed (25 lb. up)	12.25 -
Bleached (25 lb. up)	11.25 -
Unbleach (25 lb. up)	9.50 -
Greaseproof—	
Bleach. (25 lb. up)	9.20 -
Unbleach. (25 lb. up)	8.75 -
Ledgers (Rag Content)—	
100% Rag Ext. No. 1	40.25 to 47.25
100% Rag	32.20 to 37.75
85% Rag	29.90 to 35.00
75% Rag	24.75 to 29.00
65% Rag	21.65 to 26.25
50% Rag	18.70 to 22.75
25% Rag	15.80 to 19.25
Regular Colors	1.00 cwt. extra
Heavy Colors	3.00 cwt. extra

	per cwt.
Ledgers (Sulphite)—	
No. 1	9.85 to 12.00
No. 2	9.05 to 11.00
No. 4	8.20 to 10.00

	per ton
News—	
Rolls (Contract)	50.00 -
Rolls (Spot)	(nominal)
Sheets	58.00 -

	per ream
Tissues (Carlots)—	
Anti-Tarnish M. G.	.75 -
Colored	.875 -
Kraft	.75 -
Manila	.80 -
Napkins, semi-crepe (12¼ lb. to M shts.) per cs.	.46 -
Napkins, full crepe and emb'sed (12¼ lb. to M shts.) per cs.	.52 -
Toilet, Bleached (M shts.) per cs.	5.20 -
Toilet, Unbleached (M shts.) per cs.	3.20 -

	per case
Towels—	
Bleached	3.10 to 3.65
Unbleached	1.80 to 3.30

	per cwt.
Wrappings (Kraft)—	
Extra Quality	5.00 to 5.50
Super-Standard	4.50 to 4.75
Northern Standard	4.25 to 4.50
Southern Standard	4.00 to 4.25

Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)

	per cwt.
Bleached papers—	
M.F. & M.G. Waxing, 20 lb. (Carloads only)	5.75 -
(10,000 lbs.)	6.00 -
Drug wrapp. 35 lb.	6.00 -
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	4.25 -
No. 1 Butchers	4.50 -
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	4.625 -
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	4.375 -
Steam Finish, 50 lb.	3.75 -
Water Finish, 40 lb.	4.25 -
Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	4.75 -
Envp. Mla., Sub. 16-28 (No. 2)	4.50 -
Envp. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	5.00 -
No. 2	4.75 -
M. G. Sulphite (other than Waxing)	
Grade A-25 lb.	5.00 -
Grade B-25 lb.	4.75 -

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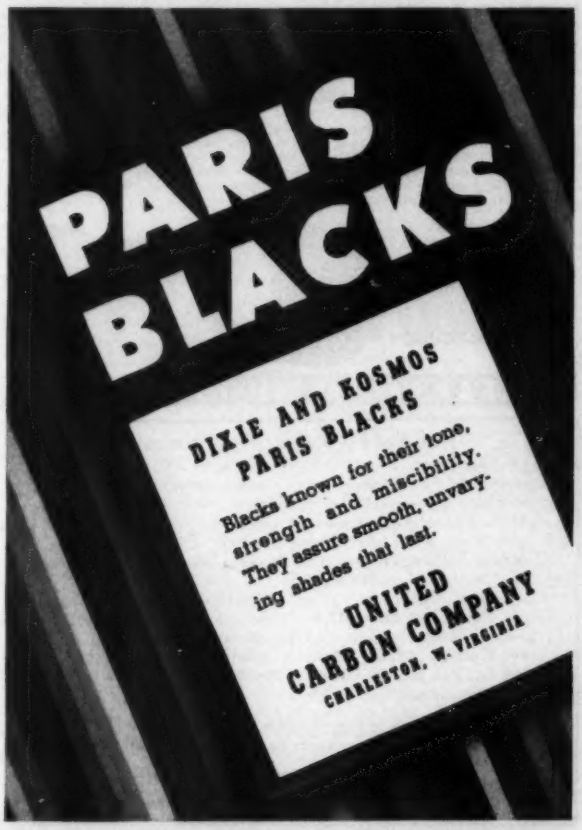
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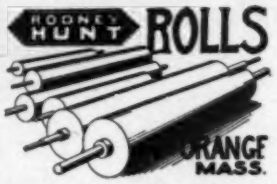

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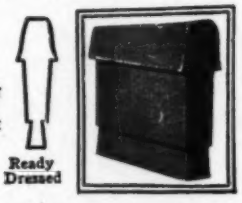

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